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## ABSTRACT

In an effort to reduce failure and attrition rates in the science department at Southeastern Community College (SCC), several aspects of the program were examined. Science faculty members analyzed course offerings, identified specific course prerequisites, and developed instructional objectives. Since reading skill is often used as a placement criterion, a study was done to correlate reading scores with science performance. It was found that 13% of the students enrolled in biology courses were reading below the ninth grade level and thus improperly placed. In an effort to improve placement, strategies used by other institutions were investigated. A 23-item needs assessment questionnaire was administered to 121 students in Spring 1979 to generate a student profile, and evaluate students' preparation and career plans as they related to the science curriculum. A science educator from a local university was invited as a consultant to review the SCC science program and make recommendations in interim and final reports. Information presented at a National Science Foundation conference was shared with faculty members to stimulate development of innovative instructional methods. Results of the various investigations are presented in the text of the report. The student profile, course outlines, student assessment questionnaire, and various cognitive and predictive tests are appended. (DR)

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ED175496

**Comprehensive Assistance To  
Undergraduate Science Education  
National Science Foundation**

**Local Assessment of  
Science Education  
in the Two-Year College**

**RESEARCH  
REPORT  
JUNE, 1979**

U.S. DEPARTMENT OF HEALTH,  
EDUCATION & WELFARE  
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**SOUTHEASTERN COMMUNITY COLLEGE  
WHITEVILLE, NORTH CAROLINA**

"An Equal Employment  
Opportunity/Affirmative  
Action Employer"

COMPREHENSIVE ASSISTANCE TO UNDERGRADUATE SCIENCE EDUCATION  
NATIONAL SCIENCE FOUNDATION

LOCAL ASSESSMENT OF SCIENCE EDUCATION IN THE TWO-YEAR COLLEGE

RESEARCH REPORT

JUNE, 1979

ROBERT L. KING, PROJECT DIRECTOR  
DONNA E. SCOTT, PRINCIPAL INVESTIGATOR

Southeastern Community College  
Whiteville, North Carolina

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- Dr. Ronald D. Simpson, Project Consultant, for technical expertise and personal "savoir faire" to say the right thing, to the right people, at the right time
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- Mrs. Emily Owens, Lab Instructor, for her quiet, precise, sensitive analysis
- BOB, LOIS, and MARION for being concerned about student needs, professional enough to seek criticism, and patient enough to give the extra time and effort that growth requires.

Donna E. Scott  
Report Editor

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## INTRODUCTION

As early as September, 1975, Southeastern Community College (SCC) was informed of a new National Science Foundation (NSF) program entitled Comprehensive Assistance to Undergraduate Science Education (CAUSE), and interest was aroused in applying for a grant under this program. CAUSE seeks to

"...strengthen the undergraduate science education components of 2- and 4-year colleges and universities;

- improve the quality of science instruction at the undergraduate level; and

enhance institutional capability for self-assessment and continuing updating of their science programs."

The Science Department faculty at SCC recognized the problem of a large percentage of students performing unsatisfactorily in freshman science courses. The faculty felt they needed to be able to predict which students lacked the skills, knowledge, and/or attitudes necessary to complete science courses successfully. Robert King, Science Department Coordinator, wrote a project proposal and submitted it to NSF. (See Appendix A.) In the spring of 1978, Southeastern Community College was granted \$5,000 for "Local Needs Assessment in Science Education."

A committee was formed to guide the project's direction and some work was done in the spring and summer of 1978. Attached in Appendix A are minutes of the committee meetings and an initial science student profile. The loss of a science faculty member increased teaching loads for the faculty in the fall of 1978, and the decision was made to hire a principal investigator for the project. In December this was done and work began. This is a report of the findings.



## DESCRIPTION OF SCC SCIENCE

Although Southeastern Community College operates on an "open door" policy and derives a percentage of its students from less than affluent backgrounds (see Demographic Profile, page 23), the science faculty feel a responsibility to maintain the "difficulty" of college-transfer science courses at a level comparable to freshman biology at other colleges and universities.

Biology 101, 102 and 103 are three quarters of introductory life science taken by many SCC freshmen and sophomores in the college-transfer program. Appendix B contains course outlines. The text used in the fall of 1978 through the spring of 1979 was Invitation to Biology, Helena Curtis, Worth Publishers, Inc., New York, 1977. Lab materials are locally developed and are coordinated with Ealing Film Loops, Oxford Scientific Films. A departmental final exam has been developed and is used for the three quarters.

Physical Science 101, 102 and 103 are taught by the audio-tutorial method. Syllabi for the three quarters are in Appendix B. Since this grant speaks primarily to the biology course, data concerning PHS 101, 102, and 103 will be incomplete. It is hoped that any conclusive findings of this project can be applied to the physical science course after implementation and approval in biology.

Using the Fry Readability Test, the following levels were determined.

|                               |                   |
|-------------------------------|-------------------|
| <u>Invitation to Biology</u>  | college sophomore |
| locally developed lab packets | 12th grade        |
| Ealing Film Loops             | 10th grade        |

- Enrollment in Biology for two years (fall 1976 through summer 1978) was.

| <u>BIO 101</u> | <u>BIO 102</u> | <u>BIO 103</u> |
|----------------|----------------|----------------|
| 455 STUDENTS   | 320 STUDENTS   | 255 STUDENTS   |

Grade sheets for nine quarters (fall 1976 - fall 1978) of BIO 101, 102, and 103 were reviewed. Chart 1 on page 4 displays the findings.

#### SUMMARY

Forty-two percent of the students taking BIO 101 make a "D" or an "F," and an average of 25% of the students in 102 and 103 are unsuccessful. In addition, the attrition rate results in 44% of the students never reaching the third quarter of biology.



# CHART 1

## BIOLOGY GRADE SURVEY

### % OF STUDENTS MAKING GRADES

|              | D - F | D    | F    |
|--------------|-------|------|------|
| BIO 101      | 37.2  | 18.4 | 18.8 |
| *RSL BIO 101 | 61.9  | 21.2 | 40.7 |
| ALL SECTIONS | 41.9  | 18.9 | 23.0 |
| BIO 102      | 20.1  | 8.8  | 11.3 |
| *RSL BIO 102 | 33.3  | 16.0 | 17.3 |
| ALL SECTIONS | 23.4  | 10.6 | 12.8 |
| BIO 103      | 29.1  | 14.3 | 14.8 |
| *RSL BIO 103 | 15.6  | 3.1  | 12.5 |
| ALL SECTIONS | 27.4  | 12.9 | 14.5 |

\*RSL STANDS FOR RESOURCES FOR STUDENT LEARNING. THESE SECTIONS ARE CONSIDERED DEVELOPMENTAL. MORE EXPLANATION FOLLOWS.

## INTERVIEWS WITH SOUTHEASTERN COMMUNITY COLLEGE PERSONNEL

In an effort to understand the scope of placement problems in science, the principal investigator interviewed several SCC staff and faculty members.

### Bob King, Lois Bailey, Marion Martin, Science Faculty

The science faculty's concern for students not performing well in science prompted the writing of the grant proposal. They knew a high percentage of students were failing and they wanted to be able to "spare" these students the unhappiness of many hours in a course for which they were ill-prepared. The faculty have been willing to consider modifications in course content and procedure. They are also willing to revive a developmental or remedial science course to prepare students for regular science courses but for which students would receive no credit. One objective of this project is to justify the need for such a course.

### Winnie Cooke, Director of Resources for Student Learning

Mrs. Cooke, who has taught biology for the science department at SCC, now heads Resources for Student Learning which she helped to develop. RSL philosophy is: all students can learn, although at different rates, and disadvantaged students deserve extra attention, more time, and specialized teaching methods.

Students are required to take RSL courses if they score below the ninth grade level on the Nelson-Denny Reading Test and/or do poorly on the locally developed English Placement Test. RSL courses should cover the same major concepts as "regular" courses, but should (1) meet more times per week, (2) provide extra attention and counseling in order to aid the "whole" student, and (3) use varied teaching techniques.

RSL students may take all RSL classes or part RSL and part regular classes; RSL courses are considered "developmental" not "remedial." Biology courses in the RSL program are taught by regular science staff who may or may not espouse the philosophies of RSL. RSL has been very successful at readying students for regular courses.

Ed Grigsby, Math Department Coordinator

"Gross" screening for Math 101 is done by using (1) math grades in high school, (2) courses taken, (3) time elapsed since last math course, and (4) advisor interview. "Fine" screening is done the first day of class with a departmental test which is course-specific. Examples: The end exam for MAT 101 is the entrance exam for MAT 102.

The Math Department and the Counseling Center are experimenting with the math section of the Wide Range Aptitude Test (WRAT) for placement purposes. Dr. Grigsby felt the need to know what math skills the science department desires of students and at what level.

Kathy Justice, Reading Coordinator

Mrs. Justice explained placement procedures in reading courses. The standardized test used is the "Nelson-Denny Reading Test for High Schools and Colleges," M. J. Nelson and E. C. Denny, Houghton-Mifflin Co., Boston, 1960. Students scoring below the ninth grade level must take Reading 91. Students scoring between the ninth and fourteenth grade reading level must take Reading 101. Students reading above the fourteenth level are not required to take a reading course.

Mrs. Justice and Ms. Sandra Green explained the Fry Readability Test and agreed to help with a study comparing reading placement scores to science grades. SCC reading courses are reputed to raise a student's reading level an average of four years in one quarter (as measured by the Nelson-Denny).

Thelma Barnes, English Department Coordinator

Prior to the fall of 1977, the Comparative Guidance and Placement Test was used to place students in English composition courses. A locally developed English Placement Test is now used and has been locally validated. Students are placed into one of three introductory English courses. See Appendix B for course descriptions.

Frank Leach, SCC Testing Coordinator

Mr. Leach provided several catalogs of standardized tests, the WRAT math section, and the Nelson-Denny Test. He suggested that careful consideration be given before adding a science placement test to the existing battery of tests that new SCC students must already endure!

Robert Brooks, SCC Counselor

Mr. Brooks felt that placement of science students by assessing high school transcripts would be difficult since grades are nearly impossible to compare from teacher to teacher or school to school. He thought students who had no science courses beyond general science might be placed in a developmental science class, since poor students frequently dodge math and science.

Because a number of SCC students receive funding through the Basic Educational Opportunities Grant, it is important that the new guidelines for qualification be considered. A fifth year of funding is now available to students who are required to take an extra year of developmental courses in order to complete a Bachelor's degree.

## ANALYSIS OF VARIOUS PLACEMENT PROCEDURES

A search was made for existing procedures for placement of students in introductory college science courses.

### CONTACTS

Dr. Susan McDaniel, Vice Chancellor for Academic Affairs, East Carolina University, sent a test used once experimentally in freshmen biology. No significant correlation was found between pre-test scores and course performance.

Dr. Harold Mitchell, Science Department, Roanoke-Chowan Technical Institute, reported that RCTI does not use any placement procedures in science (but it does in reading, math, and English). In research for his Ph.D. in Science Education, Dr. Mitchell correlated several measures of attitude with cognitive achievement in introductory biology at three community colleges in North Carolina. One significant finding was that academic self-concept declined from pre- to post-course measurement. The same was true with attitude toward the institution. When various affective measures were correlated with achievement in biology for the composite sample, it was found that both attitude toward biology and academic self-concept were significant predictors of achievement in biology at the .001 level of probability.

Mitchell concluded that attitudes toward biology and toward self significantly predict success in introductory college biology. He also concluded that at the three institutions he studied, attitudes toward self, biology, institution and instructors either stay about the same or decline during the first quarter in introductory biology (which for most students was their first quarter in college).



Dr. Parker Chesson, President, College of the Albemarle, researched the effectiveness of twelve predictors of success in his dissertation (Ph.D., Science Education). Such instruments as class placement, CGP reading score, CGP math score, and micro-learning units were compared as reliable instruments for predicting success in college freshman biology. Dr. Chesson's work was done at three North Carolina community colleges: Southeastern, College of the Albemarle, and Sandhills. Test scores on the micro-learning unit were found to correlate the highest with biology grades. This procedure has some drawbacks in that it is time-consuming and impractical to administer prior to school registration in the fall. College of the Albemarle is doing no diagnostic screening of science students at this time.

Jim Hall, biology instructor at Central Piedmont Community College, is using CPCC's reading instructors to assess the reading level of biology course materials. They are not placing students into or out of biology at this time.

Ruby Harbison, Western Piedmont Community College biology instructor, reported that no screening of students was being done, but ones who make 'D' or lower are required to attend a supplemental lab help-session (two-hours/week).

Dr. Mary Townes, N.C. Central University, was most understanding of the problem of unprepared science students. NCCU does not place science students but makes every effort to work with them "where they are."

Bobbie Jean Nicholson, Brevard College, was directing an NSF Local Needs Assessment project in the spring of 1979. Four segments of the new College Board (CGP) tests were being correlated with grades in science — reading, motivation, math, and English. Although computer results were not available when Ms. Nicholson was interviewed, she said "motivation" scores appear to be the best predictor. Placement procedures in the fall of 1979 will probably consist of a combination of SAT math scores, CGP reading and motivation scores, and high school science course grades.

Dr. R. A. Prudhon, Natural Sciences Department Head, Shelby State Community College, Memphis, Tennessee, circulated a questionnaire in the winter quarter 1978-79 indicating that SSCC was considering the use of diagnostic testing to place students in science courses. The questionnaire was most comprehensive and indicated that Shelby State was researching problems similar to those at Southeastern.

Robert J. Wilkins, Western Piedmont Community College, performed a study in the spring of 1977 to "determine the relationship between Comparative Guidance and Placement Test scores and success in Biology 101." Using three sections of the CGP (reading, sentences, and math), he correlated final grades in biology for 60 successful and 48 non-successful students. ("Non-successful" was defined as a letter grade lower than "C.") Wilkins' results were fairly narrow in scope, but he felt that more study was warranted and that "reading scores might be valid predictors of the chances of success in Biology 101."

#### SUMMARY

The decision to place students in any courses requires extensive forethought. Other institutions, two-year and four-year, seem to be struggling with the problem of a good "fit" among student needs, school needs, course content, and student ability. Many research projects that were evaluated concluded that there was no good, consistent predictor of student success.

Screening students is only a small piece in a large puzzle of curriculum, counseling, articulation, and remediation. Even if we were convinced that course content and procedures were most appropriate, we found that we could not screen students from existing courses unless

- (1) The existing courses required skills far above those of the students,
- (2) Other course options existed for those students to develop needed skills, and
- (3) Our instrument for predicting success was accurate, valid, and reliable.



## READING - SCIENCE GRADES COMPARISON

Traditional college courses require many reading, writing, and verbal skills. Students must read texts and other written materials, take notes from class lectures, and be able to read and write accurately at test time. Because biology at Southeastern is very traditional, it proved helpful to compare students' reading ability to their science achievement.

A sample of 189 students was used. Grades in Biology 101 (the quarter with the highest percentage of failures and attrition rate) were compared to raw scores on the Nelson-Denny Reading Test. A scatter gram was graphed so as not to eliminate a single score.

The study revealed that some extant placement procedures were not being enforced; 13% of the students (ones reading below the ninth grade level) should not have been taking biology.

Only one person who read below the ninth grade level was able to make above a "D" in biology. Only seven people out of 189 (4%) were able to pass biology reading below ninth grade. Being a good reader, however, does not ensure one of success in biology. A wide range of reading abilities occurs at each grade level.

| <u>grade in BIO 101</u> | <u>range in reading grade level<br/>(year.month)</u> |
|-------------------------|--|
| A                       | 11.1 → above 14.0                                    |
| B                       | 9.0 → above 14.0                                     |
| C                       | 7.4 → above 14.0                                     |
| D                       | below 7.0 → above 14.0                               |
| F                       | below 7.0 → 13.6                                     |

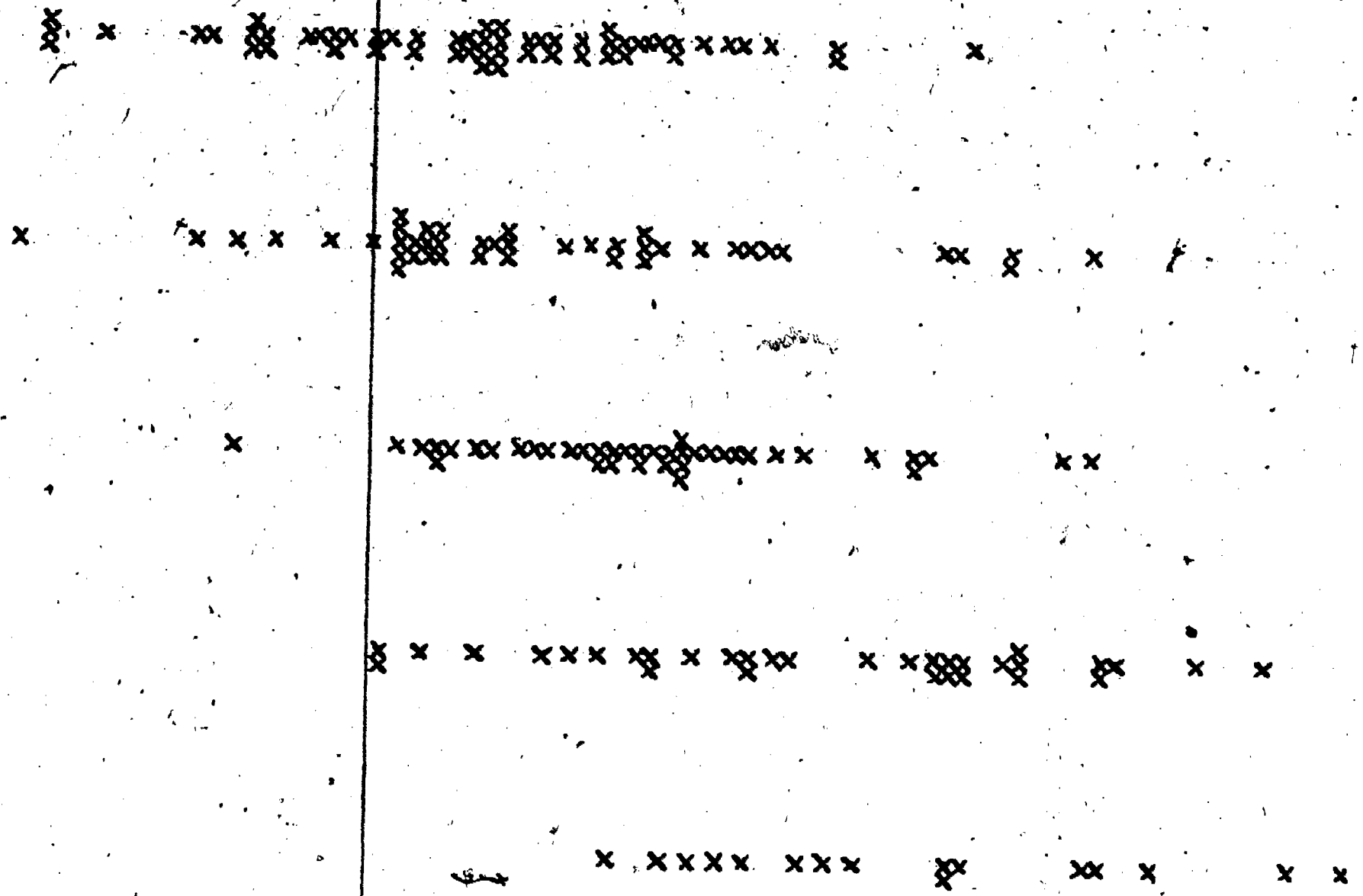
5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115

NELSON-DENNY READING TEST SCORES

8TH 9TH 10TH 11TH 12TH 13TH GRADE EQUIVALENTS

GRADE IN BIO 101

F D C B A



### CONSULTANT'S INITIAL REPORT

In January 1979, Dr. Ronald D. Simpson, Mathematics and Science Education Department, North Carolina State University, was hired to come to Southeastern and perform the following tasks:

- (1) Read grant and assess work done to date
- (2) Assist science faculty (Mr. Bob King and Ms. Lois Bailey) in writing behavioral objectives and prerequisites for BIO 101, 102, and 103
- (3) Review previous studies done to predict student success in biology
- (4) Outline future steps to be taken by principal investigator to develop a pre-test.

### TEXT OF CONSULTANT'S REPORT

"I enjoyed my visit to your campus last week and would like to thank you and your staff for cooperating in such an excellent fashion. I am including a summary of the most important things we discussed and trust that these observations and recommendations will be helpful as SCC continues to improve the science curriculum.

"Observation 1: The faculty of the science division is a dedicated, hardworking unit. Their teaching load is heavy and they have the students' interest at heart.

"Observation 2: Current offerings in biology are geared for the biology major. The course content is rigorous and successful students appear to have the necessary skills to transfer to other colleges and do well.

"Observation 3: The attrition rate of students moving to BIO 102 and 103 from BIO 101 is inordinately high. In looking at the content of the courses it appears that the most abstract levels of biology are being taught first with a large segment of students being eliminated before they get to the more practical, applied areas. It is my conclusion that the current BIO 101, 102, 103 structure does not meet the needs of students majoring in areas other than biology. My impression was that probably no more than 5 percent of the students currently enrolled major in biology or some science-related areas. As a result, the science enrollment at SCC, particularly in biology, appears to be lower than normal.

"Observation 4: The current RSL course sequence in biology does not appear to differ from the tract for regular students except for the one additional hour of classtime they receive. Since RSL students are different in many ways, the alternatives offered this group should reflect these differences.

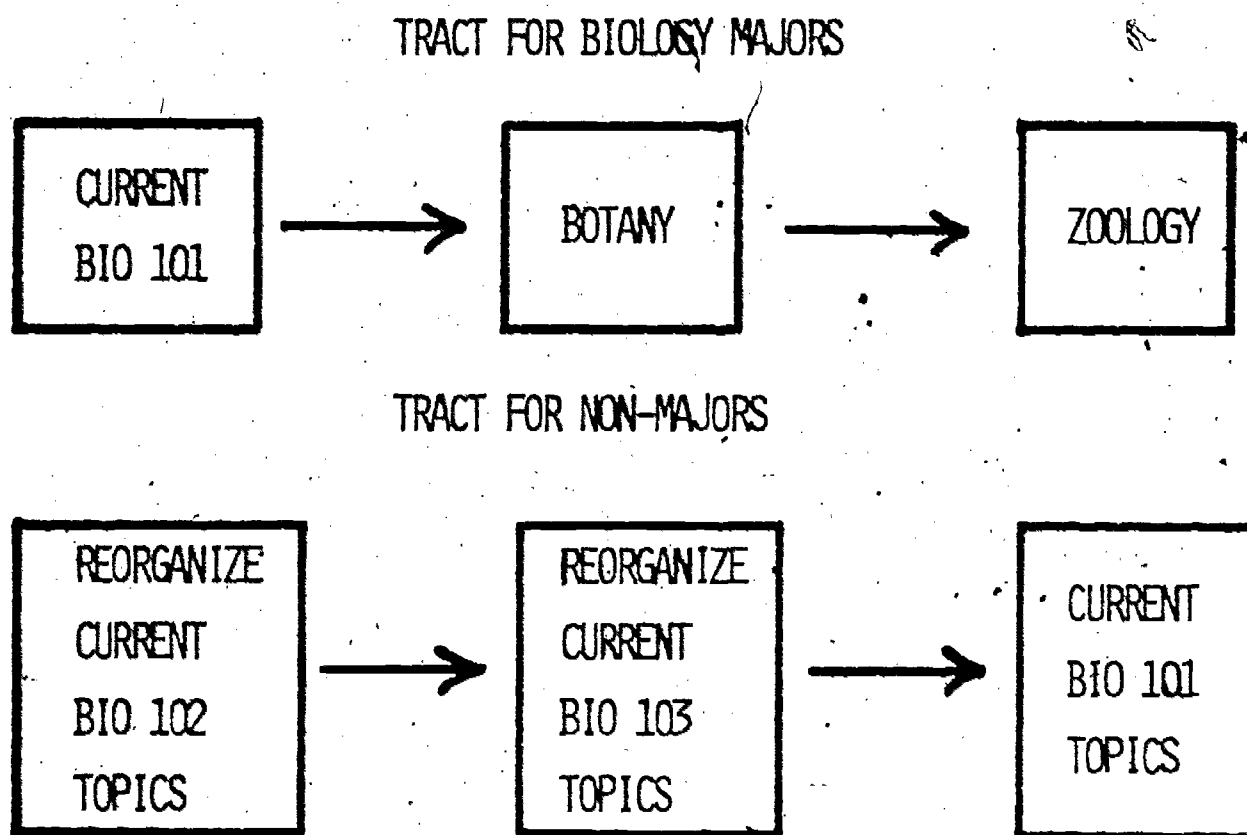
"Observation 5: There is not an option in the science curriculum for students who possess serious deficiencies in science. Often these deficiencies include 'science-phobia' and other anxieties that less successful students develop toward the sciences and mathematics.

"Observation 6: There does not exist a systematic method for diagnosing student skills and attitudes in the sciences for subsequent placement in the curriculum. In my opinion, reading level, which is the sole criterion at present, is not a sufficient indicator by itself for placement in science courses.

"The following are recommendations, some of which we discussed, that your faculty and administration may wish to consider:

"Recommendation 1: Science offerings at SCC, like all community colleges should be designed to meet the needs of all students. The overall goal of science education should be to develop students who are scientifically literate and who possess positive feelings toward science. Major principles, fundamental learning processes, relationships among science-technology-society, and appropriate attitudes and values should be stressed and considered important for all citizens of this country. While it is important to offer courses that are 'respectable' for prospective science majors, it is, in my opinion, equally important to teach science in such a manner that future homemakers, attorneys, mechanics, politicians and civic leaders can appreciate and apply.

"Recommendation 2: At least the first two courses in biology should be fashioned so that non-science majors can be exposed to important aspects of the discipline that are relevant to all individuals. Such topics as nutrition, behavior, reproduction, birth control, ecology, drugs and alcohol, pollution, etc. are generally appealing to all students and should be used to develop interest and relevance early in the curriculum. The current biochemical emphasis might well be held to a later course or used in its present sequence for 'honors' level students. One thing we discussed was that prospective biology, botany or zoology majors take the current BIO 101 and move directly into the botany and zoology courses. This might look something like this:



"Recommendation 3: Courses in biology for RSL students should be different from those in the regular tract. The courses should be high interest, provide concrete experiences, maximize 'hands-on' activities, and emphasize fundamental skills and processes that are basic to learning to all areas. This sequence should be taught by an instructor who has the interest and educational skills necessary to work successfully with academically immature and less successful students.



"Recommendation 4: Assuming there is a core of common skills that both physical and biological science faculty can identify as being minimally necessary for all entering students, a remedial course should be developed. The course should not cover the same content as already existing courses but, rather, should deal with basic quantitative skills that are lacking and negative attitudes that unsuccessful science students often possess. Such things as observing, measuring, using numbers, science vocabulary, science study skills, logical reasoning and understanding key aspects of scientific methodology should be emphasized.

"Recommendation 5: An instrument should be developed to help diagnose and place entering freshmen into the proper science sequence. The instrument should measure such things as 1) critical thinking ability, 2) science aptitude, 3) basic science process skills, 4) reading skills associated with science material, and 5) academic self-concept in science and perhaps other attitudinal measures and career expectations.

"Recommendation 6: As the science offerings at SCC expand to include more non-science majors, student enrollment should increase. To influence this shift in orientation, another faculty member should be added. An individual is needed who possesses specific educational skills in curriculum planning, evaluation methodology and instructional design. As community colleges move toward serving a more diverse population of students, faculty with specific educational skills will be needed.

"Within the next week I shall send to Donna specific suggestions for items your department may wish to include in a diagnostic and predictive scale. I would suggest that the first two or three times the scale is used that student scores be correlated with achievement in biology to see which measures do the best job predicting academic success.

"I have enjoyed working with you on your project and trust that should you decide to expand this project for another year that you will call on me if I can be of further service. I think Donna Scott is doing an excellent job as coordinator. She is very talented and should be of great assistance in drawing this year's work to conclusion and helping with future plans of your department."

/s/Ronald D. Simpson  
Associate Professor of  
Science Education  
N.C. State University

## NSF - AMERICAN ASSOCIATION OF COMMUNITY AND JUNIOR COLLEGES CONFERENCE REPORT

The National Science Foundation and the American Association of Community and Junior Colleges co-sponsored a project directors' conference in Washington, DC, February 7-9, 1979. It was attended by approximately 200 NSF project directors, 36 of whom were directing "local needs assessment" projects in two-year colleges.

### Session I: SHARING OF REPORTS OF LOCAL ASSESSMENT PROJECTS BY THE PROJECT DIRECTORS

Dr. Richard Wilson, AACJC Vice President for Programs, presided. Twelve project directors from seven states described their NSF local assessment projects.

### Session II: MISSIONS AND STRATEGIES IN SCIENCE EDUCATION

Four officials from NSF, Science Education Division, explained their goals and direction in setting up programs. A booklet ("Guide to Science Education Programs," FY 1979) outlines the current programs that are being funded.

Outstanding points:

- (1) Science Education Development and Research programs are getting increased funding by NSF!
- (2) Projects should address the general student, not just science majors.
- (3) NSF will give special attention to projects that emphasize science participation by minorities and women.

### Session III: DISSEMINATION OF IMPROVED EDUCATIONAL MATERIALS

Disseminating the results of NSF projects to other interested schools and individuals was the topic of this session. Six people discussed different aspects of the publishing and dissemination problem.



Important points:

- (1) Dissemination should be a part of a research and/or development project from the start.
- (2) Publishing the results of a project is facilitated by (a) good project evaluation and (b) good initial press coverage, i.e., journal article.
- (3) Use libraries for dissemination. They have an excellent established procedure.
- (4) Non-profit or wealthy publishers are more likely to publish experimental materials than regular commercial publishers are.
- (5) Commercial publishers give courses on how to get things published and disseminated.
- (6) A helpful book is Into Print: How to Publish.
- (7) Books and materials are frequently sold for reasons other than the good ideas in them. They are sold because salesmen are nice, provide attentive service, and do special things for teachers.
- (8) Innovations in educational materials must be pushed even if publishers think they do not want it.

Session IV: EVALUATION OF PROJECTS

Dr. Ruth Von Blum discussed some important factors in evaluating projects.

- (1) Project objectives set standard for evaluation.
- (2) Science education project objectives might be (a) scientific literacy, (b) student self-direction, (c) student co-evaluation, and (d) affective goals, i.e., positive attitude toward science.
- (3) Cost study is an important part of an evaluation.
- (4) One might evaluate by teaching bits of a new curriculum to a small group of students.
- (5) Include the developer in the evaluation.

- (6) Use one year's students as the control group for next year's students.
- (7) This experimental design eliminates the effect of the pre-test.

Sample

|     |                                      |
|-----|--------------------------------------|
| 25% | pre-test-----treatment-----post test |
| 25% | pre-test-----post test               |
| 25% | -----treatment-----post test         |
| 25% | -----post test                       |

- (8) Standardized tests are frequently inadequate.
- (9) Ethnographic data (race, sex, age, parental educational background, etc.) is very valuable to science educators.
- (10) Shavelson has written on the interface between scientists and science educators.
- (11) Improved science instruction can make a teacher's job easier and attract more students.
- (12) Science used to be for the elite; must now be for the general public.

Session V: CLINICAL INTERVIEW AS A RESEARCH TOOL

Dr. Mary Budd Rowe coordinated this technical discussion.  
Materials are on file at SCC.

Session VI: SOME RESULTS OF RESEARCH IN "WAIT-TIME"

Dr. Rowe presented some results of research on "wait-time." Wait-time is the time that lapses between a teacher's question and a student response or between a student response and teacher reaction.

- (1) The longer the wait-time between a student response and a teacher reaction, the more complex student dialogue becomes. One implication is that longer wait-times result in more student thinking.

- (2) If verbal responses from a teacher are near neutral (he/she neither approves or disapproves a student response), two things happen: (a) more interaction between students occurs; and (b) task persistence increases!
- (3) There are several kinds of mental lapses: short flight, new meaning for an old symbol, mental fatigue, etc.
- (4) The newer the material is to a student, the more frequently he/she needs time to stop and think and process in order to avoid mental fatigue.
- (5) To cut down on mental lapses, a lecturer could stop every 12 minutes. Allow groups of three students to compare notes and "catch up" for two minutes.
- (6) Aptitudes that are important to school survival: (a) verbal, (b) number and (c) space. Different people prefer learning through different aptitudes.
- (7) Students who get material presented to them in their "best" mode, remember more, remember longer, and learn with fewer errors.

#### Session VII: COMMUNITY AND JUNIOR COLLEGES MEETING

Dr. Bill Aldridge, NSF Program Director for Science Education in the Two-Year College, outlined the NSF programs applicable to community colleges.

- (1) Local assessment projects (like ours at Southeastern) are intended to provide background documentation. Most of these grants were small and NSF does not expect miracles with \$5,000.
- (2) Local assessment projects provide excellent background for applying for additional funding for continued study and implementation. We should be assessing the needs of our (a) college, (b) community, (c) students, (d) science faculty, and (e) science curriculum.
- (3) LOCI (Local Course Improvement) provides grants up to \$40,000 for making short-term efforts at improving undergraduate science instruction. (Local institution must provide at least 1/3 of money.)

- (4) CAUSE (Comprehensive Assistance to Undergraduate Science Education) is an NSF program that grants up to \$250,000 for up to three years of science curricula improvement.
- (5) ISEP (Instructional Scientific Equipment Program) is designed to award up to \$20,000 for purchase of scientific equipment. (Local institutions provide at least 50% of the amount.)
- (6) RISE (Research in Science Education) is currently sponsoring a comprehensive national project to assess needs in science education in the two-year colleges. At present, many proposal guidelines prohibit study of developmental-remedial courses. Assessment results may result in new projects being funded in this area.
- (7) Mathematics also has funding at the two-year college level.
- (8) Dr. Arthur Cohen, Center for the Study of Community Colleges, 1047 Gayley Avenue #205, Los Angeles, California 90024, is completing a study of the two-year colleges. Twelve monographs on different science-related disciplines will be available at the end of the summer.
- (9) Dr. Cohen found that one-third of the science-related offerings were in mathematics; one-third of these are pre-algebra.
- (10) Dr. Aldridge outlined the form for our project final report. He admonished us to be truthful about what we did and did not accomplish, and to use the information as documentation for requesting additional funding.

#### Session VIII: SCIENCE EDUCATION AT NSF

Dr. George Pimentel, NSF Deputy Director, said scientific literacy is a must for our whole society. All people are on a continuum of scientific literacy, and we must move as many people as we can as far forward as possible.

#### Session IX: NEW DIRECTIONS FOR RESEARCH AND DEVELOPMENT IN SCIENCE

Dr. James Rutherford described some of the problems NSF is faced with in funding research and development projects nationally.

### VIDEODISC DEMONSTRATION

A demonstration of videodiscs was given. Videodiscs are one of the newest technologies in instruction. They resemble an LP in appearance, but are "burned" and "read" by laser. Listed are some of the characteristics of videodiscs.

- (1) A videodisc costs \$8-\$20.
- (2) A videodisc player costs \$695 and attaches to a regular TV.
- (3) A videodisc can be stopped on any one of its 54,000 frames.
- (4) A videodisc player can be played slow or fast, forward or reverse.
- (5) The most outstanding feature of videodiscs is that they may be hooked to a computer which can search for any one frame you may want to see. "Intelligent" discs have infinite possibilities.

## DEMOGRAPHIC PROFILE OF SCC STUDENT POPULATION

Students who attend Southeastern Community College and who may enroll in science courses can be described by these characteristics:

### PERSONAL DATA

- 51% male, 49% female
- 70% white, 27% black, 3% Indian
- 27 years old, average age
- 66% Columbus County residents, 30% other North Carolina counties, and 3% out-of-state residents
- Of the community served by SCC, 46% of the population 25 years of age and older have completed no more than eight grades (1970 census).
- 51% of SCC students receive some kind of educational financial aid; of these, 35% have an annual family income of less than \$3,000.

### SCHOOL DATA

- 50% full-time students, 50% part-time
- 36% of total SCC student population are taking college-transfer courses.
- Approximately 86 students per year graduate in college-transfer programs; an average of 7% or six students earn an Associate of Science degree.

### PLACEMENT DATA

- 49% students score below the ninth grade reading level.
- 75% students place below the readiness level for standard college freshman English composition course.
- 50% of the full-time technical and college-transfer students are taking two or more developmental courses.



## QUESTIONNAIRE FOR ASSESSING STUDENT NEEDS

A 23-item questionnaire was administered to 121 science students during the 1979 spring quarter. The following generalized results were obtained.

- (1) Mark all courses you have completed at SCC or at some other college. (Figures represent numbers of students.)

|    |                      |    |                   |
|----|----------------------|----|-------------------|
| 54 | Biology 101          | 5  | Human Sexuality   |
| 46 | Biology 102          | 44 | Chemistry         |
| 28 | Biology 103          | 9  | Physics           |
| 17 | Physical Science 101 | 3  | Botany            |
| 18 | Physical Science 102 | 6  | Zoology           |
| 9  | Physical Science 103 | 18 | None of the above |
| 25 | Anatomy & Physiology |    |                   |

- (2) What is your age?

60% students - 18-20 years old  
30% students - 21-30 years old  
10% students - over 30 years old

- (3) What is your sex?

60% female  
40% male



(4) What is your race?

74% White  
22% Black  
4% Indian, Oriental, other

(5) How many quarter hours are you taking now?

20% 12 or less  
40% 13-16  
25% 17-18  
15% more than 18

(6) Which science courses did you have in junior and senior high school?

70% 7th-9th grade science  
90% 10th grade biology  
60% high school chemistry  
20% high school physics  
15% advanced biology

(7) How many years has it been since you had your last high school science course?

15% less than 1 year  
40% 1-3 years  
15% 4-6 years  
30% more than 6 years

(8) Which degree program are you in?

23% Associate in Applied Science

30% Associate in Arts

7% Associate in Fine Arts

28% Associate in Science

1% Special Student

11% Undecided

(9) Do you plan to transfer to another school after attending Southeastern?

75% yes

10% no

15% undecided

(10) Do you plan to complete four years of college?

75% yes

10% no

15% undecided

(11) Which career do you plan to pursue after completing school?

33% medical/dental technician, nurse, photographer

10% engineer, forester, scientist

10% elementary teacher

10% doctor, lawyer, accountant

10% undecided

The remaining 27% are evenly scattered throughout the other careers listed. (See Appendix C: Questionnaire.)

(12) Which career (listed in number 11) would be your second choice if your first choice did not work out?

12% high school or college science teacher

12% medical technician, nurse, photographer

12% undecided

The remaining 64% are scattered throughout the other careers listed. (See Appendix C: Questionnaire.)

(13) Which job (listed in number 11) comes closest to the kind that your father holds?

30% farmer, gardener, construction worker

12% plumber, electrician, auto mechanic

12% machine operator, bus driver, factory worker

9% small business owner

The remaining 37% are scattered throughout the other careers listed. (See Appendix C: Questionnaire.)

(14) Which job (listed in number 11) comes closest to the kind that your mother holds?

40% homemaker

10% secretary, bookkeeper, bank teller, cashier

10% machine operator, bus driver, factory worker

10% medical technician, nurse, photographer

The remaining 30% are scattered throughout the remaining careers. (See Appendix C: Questionnaire.)

(15) Why are you taking science?

- . 40% indicated they liked science
- . 5% take science as an elective
- 95% take science because it is required

(16) Do you think science meets your needs as a human being?

- 62% more than most other courses
- 5% less than most other courses
- 33% about the same as other courses

(17) How do you feel about the difficulty of science courses here at Southeastern?

- 65% challenging but not impossible
- 25% just right for me
- 5% too easy
- 5% too hard

(18) What are your grades in science?

- 63% A or B
- 30% C
- 7% D or F

(19) Do your science grades reflect how much you learn?

- 65% learn much and make good grades
- 25% learn much and make poor grades
- 6% don't learn much and make good grades
- 3% don't learn much and make poor grades

Therefore, 90% say they "learn much!"

- (20) In which type(s) of activities do you spend most of your time for/in your science class?

Most time is spent in lecture by teacher. Equal time is spent by students in lab and in individual study. Very little time is spent on special projects, demonstrations or field trips.

- (21) In which type(s) of activities do you feel that you are able to learn the best?

Students feel they learn the most in lecture by teacher; labs, individual study, class discussion, and demonstrations are also rated highly.

- (22) Which topics did you not study in science at SCC but wish you had?

Marked most frequently were:

- Drugs
- Energy conservation
- Overpopulation problems
- Sex education

- (23) On the answer sheet, please write any comments that you feel might improve science courses at SCC.

(See Appendix C.)

## PREREQUISITES FOR SCIENCE COURSES

It was imperative that the SCC science faculty indentify pre-requisite skills and knowledge for introductory courses. Since there were no written instructional objectives for biology, the process was demanding and the list required several revisions.

Before identifying these prerequisites, the faculty were encouraged to review syllabi and write course goals and objectives. Lecture and lab outlines, syllabi, goals, titles of text, and instructional objectives were collected from other schools for SCC faculty to review. The following institutions were gracious enough to share their materials on introductory science courses.

- (1) Central Piedmont Community College - precise listing of general and specific objectives, methods of instruction and evaluation, and detailed student hand-outs for Biological Science, General Botany, and General Zoology.
- (2) East Carolina University - course outlines and goals for Principles of Biology, Plant Biology, Zoology, and Environmental Biology.
- (3) North Carolina Central University - course outline, laboratory schedule, competency-based objectives, and grading procedures for two semesters of General Biology.
- (4) North Carolina State University - detailed student guide to BS 105 "Biology in the Modern World." Guide contains grading procedures, course outline, lab schedule, and optional reading lists.
- (5) University of North Carolina at Wilmington - lecture and lab schedules and course goals for BIO 105 "Concepts of Modern Biology."
- (6) Western Piedmont Community College - science course listings and a comprehensive manual for General Biology students. Manual includes course procedure, grading policy, course goals, and specific instructional objectives for each chapter studied.

List A, which follows, is a listing of the knowledge and skills that were identified by the SCC science faculty initially as being prerequisite for BIO 101. After careful consideration List A was amended to form List B, a list of absolute minimum prerequisite skills that a student would need to pass biology, and List C, a group of recommended skills. The recommended skills are skills used frequently throughout the year, and students would be more likely to succeed in biology if they had these skills,

List D is the group of skills listed originally as being prerequisite for physical science. List E is the amended listing of prerequisites, and List F is recommended skills for physical science students.



## ORIGINAL PREREQUISITES

Students entering Biology 101 must be able to:

1. Add, subtract, multiply, and divide whole numbers, common fractions, and decimal fractions.
2. Measure distance, volume, and mass in metric units.
3. Differentiate mass from weight.
4. Measure weight of objects in grams using a triple-beam balance.
5. Convert measurements within the metric system, i.e., meters to centimeters.
6. Make size comparisons of decimal fractions, i.e., comparison of .1 m to 1 cm.
7. Select and record in outline form outstanding facts from a class lecture.
8. Draw rough sketches of diagrams taken from the text or from the board.
9. Observe and record happenings and data in a laboratory situation.
10. Read scales in decimal fractions.
11. Define "cell," "membrane," "compound," and "element."
12. Write the chemical symbols for the basic organic elements.
13. Divide a word into its root word, prefixes, and suffixes.
14. Differentiate between a compound and an element.
15. Translate data from charts, graphs, and diagrams into written and oral sentences.
16. Name the compounds that these symbols represent:  $O_2$ ,  $CO_2$ , and  $H_2O$ .
17. Solve mathematical word problems.

LIST B

PREREQUISITES FOR BIOLOGY 101  
SOUTHEASTERN COMMUNITY COLLEGE

Students entering Biology 101 must be able to:

1. Read on the ninth grade level as measured by the Nelson-Denny Reading Test.
2. Write a grammatically correct paragraph as measured by the SCC Local English Placement Test.

LIST C

RECOMMENDED SKILLS FOR BIOLOGY 101  
SOUTHEASTERN COMMUNITY COLLEGE

Students entering Biology 101 are more likely to succeed if they can:

1. Add, subtract, multiply, and divide whole numbers, common fractions, decimal fractions, and percentages.
2. Read printed directions and perform as many as five sequential acts.
3. Select and record in outline form outstanding facts from a class lecture.
4. Read scales in decimal fractions.
5. Divide a compound or complex word into its combining forms, such as root word, prefixes, and suffixes.
6. Read data from charts, graphs, and diagrams, and interpret data into written and oral sentences.

LIST D

ORIGINAL PREREQUISITE SKILLS IN PHS 101

1. Basic math - multiplication, division, addition, subtraction of whole numbers, decimal fractions, fractions, and scientific notation.
2. Simple understanding of the metric system and its use, - NOT CONVERSION TO AND FROM THE ENGLISH SYSTEM.
3. The ability to read with understanding up to the 11th grade level.
4. The ability to express themselves with understanding in a written sentence or paragraph.
5. The ability to follow printed directions.
6. A command of the English language.

LIST E

PREREQUISITES FOR PHYSICAL SCIENCE 101  
SOUTHEASTERN COMMUNITY COLLEGE

Students entering Physical Science 101 must be able to:

1. Add, subtract, multiply and divide whole numbers, common fractions, decimal fractions, and percentages.
2. Read on the ninth grade level as measured by the Nelson-Denny Reading Test.
3. Write a grammatically correct paragraph as measured by the Southeastern Community College Local English Placement Test.

LIST F

RECOMMENDED SKILLS FOR PHYSICAL SCIENCE 101  
SOUTHEASTERN COMMUNITY COLLEGE

Students entering Physical Science 101 are more likely to succeed if they can:

1. Measure distance, volume, weight, and mass in metric units.
2. Read printed directions and perform as many as five sequential acts.
3. Select and record in outline form outstanding facts from a class lecture.
4. Read scales in decimal fractions.
5. Divide a compound or complex word into its combining forms, such as root word, prefixes, and suffixes.



## REVIEW OF VARIOUS PREDICTIVE INSTRUMENTS

Predicting academic success is an "elusive butterfly" for educators and psychologists. Some of the many variables involved in student performance are

- familiarity of the subject matter
- method of subject matter presentation
- student motivation
- teacher enthusiasm
- physical health of student
- attitudes of student toward self, school, teacher, and subject
- primary learning modality of student
- basic skills level of student—cognitive and motor
- Piagetian reasoning level of student.

With so many variables acting in any given situation, reasons for student success and/or failure are very difficult to predict.

Several tests were reviewed by the SCC science faculty in an effort to find one(s) that would measure basic "thinking" and "reasoning" skills. Knowledge about science was not listed as a prerequisite, so achievement tests such as the Nelson Biology Test and the Cooperative Science Tests were not chosen. Watson-Glaser Critical Thinking Appraisal purportedly measures a desired skill, but the reading level was too difficult. Several tests were discarded because it was felt that they did not discriminate at a low enough level. Appendix D contains a list of sample tests reviewed but deemed inappropriate.

Concrete reasoning level versus formal reasoning level (Piaget) was a concern of the principal investigator. Much of college biology is taught on an abstract, molecular, hypothetical level. Several studies by Dr. John Renner of the University of Oklahoma have shown that many college students are still operating on a less sophisticated, concrete level of reasoning. Attempts were made to find an instrument appropriate for measuring this phenomenon, but the "state of the art" is such that testing frequently involves clinical interviews. This would not be practical for 200 freshmen per year.

## TRIAL PREDICTIVE INSTRUMENTS

Three measures were chosen by the science faculty as trial predictive instruments. They were administered to science students in the spring quarter 1979 and correlated with final grades.

### YEAR 2000

The Year 2000 is a segment of the "Comparative Guidance and Placement Program" offered by the College Entrance Examination Board. The student handbook describes the test as a measure of "...your ability to follow complex directions and fit together bits of information. Students who do well in this test also seem to do well in business, health, and technical programs." The Nursing Program at Southeastern Community College uses this test as part of its entry requirements, so the college owned a complete set of test booklets, answer sheets, and test manuals. The test requires little reading ability but does require the student to bring several factors to bear on a single problem. It consists of 20 questions and a ten-minute time limit.

### POST HIGH-SCHOOL SELF-CONCEPT OF ABILITY SCALE

This scale of academic self-concept was developed by Dr. Wilbur Brookover, Department of Urban and Metropolitan Study, Michigan State University. (Brookover, W. B., et. al. Improving Academic Achievement Through Students' Self-Concept Enhancement. East Lansing: Michigan State University, 1963. Final report of Cooperative Research Project No. 1636, Bureau of Educational Research Services.) Attitudinal measures such as this have been used with some success to predict success in science (and other) courses. The scale consists of twelve items in which students rank themselves from "best" to "poorest" academically. "A" answers are worth five points, "B" answers worth four points, "C" answers worth three, and so on. Scores can range from 12 (lowest academic self-concept) to 60 (highest academic self-concept). (See Appendix D for a copy of the scale.)

## COGNITIVE DIAGNOSTIC TEST

The Cognitive Diagnostic Test was developed by Ellen Korn, Associate Professor, Natural Science Division, Jefferson Community College, Louisville, Kentucky, as part of a three-year "Multilevel Remediation Project in Biology, Chemistry and Mathematics." Two objectives of the project were

- (1) to determine the cognitive skills required in freshman level biology, chemistry and mathematics courses, and
- (2) to design a cognitive diagnostic test for these skills.

The test contains 40 items and is untimed. (See Appendix D for copy of test and master answer sheet.) The cognitive skills which the test was designed to measure are listed below.

### VERBALLY DEFINED LANGUAGE

Verbally Defined Language /  
Search Process for Words  
Word Construction

### VISUAL ABSTRACT LANGUAGE

Visual Language  
Abstract Language  
Simple Visual Relationships

### PATTERN RECOGNITION

Elementary Sorting Processes  
Elements of Discovery  
Search Process for Patterns  
Systematic Sorting Processes  
Complex Visual Relationships  
Coupling Words and Patterns

### CLASSIFICATION AND ELEMENTARY LOGIC

Generalities and Specifics  
Recognition of Argument, Justification and Proof  
Identification of Inference  
Recognition of Presupposition  
Recognition of Implication

### LOGICAL INTERACTION

Complex Relationships of Words and Patterns  
Diagram, Flow Chart and Graph Interpretation

## REPORT OF CORRELATIONS

Achievement in Biology 102, 103, and Anatomy and Physiology (1979 spring quarter) was correlated with two cognitive tests and one affective measure. The table on page 43 summarizes results. Computations were performed at the Southeastern Community College Data Processing and Computer Center, and print-outs are on file at SCC.

It should be pointed out that attempts to produce a prediction equation for placing students in biology courses at SCC should incorporate the total range of students at this college. The pilot study here basically includes sections of biology that have been skewed by prior section or attrition. With the two classes considered most heterogeneous, however, correlation coefficients were the highest. The Year 2000 test correlated .79 with BIO 103 (RSL section). The Brookover Scale of Academic Self-Concept correlated .70 with BIO 103 (RSL). In both of these cases the correlations are highly significant, and should coefficients of this magnitude be produced in subsequent studies one would have to consider these tests as potentially reliable predictors of success in biology.

Generally speaking, correlation coefficients above .4 or .5 are considered educationally important. No conclusions can be drawn from these data, but potentially strong relationships are suggested. This is particularly true for those courses which include a wider range of student ability. Using all BIO 101 students next fall should minimize the problem that was experienced this spring when only more homogeneous classes were available for testing.

The range of raw scores for the three instruments follows.

|                             | Possible<br>Range | SCC Students'<br>Range |
|-----------------------------|-------------------|------------------------|
| Cognitive Diagnostic Test   | 0 - 40            | 10 - 39                |
| Year 2000 (CGP)             | 0 - 20            | 5 - 18                 |
| Academic Self-Concept Scale | 12 - 60           | 33 - 60                |

# TABLE OF CORRELATIONS

| CLASS                       | NUMBER OF STUDENTS | TEST                        | MEAN SCORE | COEFFICIENT OF CORRELATION |
|-----------------------------|--------------------|-----------------------------|------------|----------------------------|
| BIOLOGY 102 KING            | 21                 | COGNITIVE DIAGNOSTIC TEST   | 17.6       | .21                        |
| BIOLOGY 103 BAILEY          | 32                 | COGNITIVE DIAGNOSTIC TEST   | 24.9       | .43                        |
| BOTH                        | 53                 | COGNITIVE DIAGNOSTIC TEST   | 21.9       | .45                        |
| BIOLOGY 103 KING            | 24                 | CGP YEAR 2000               | 12.0       | .45                        |
| BIOLOGY 103 RSL             | 9                  | CGP YEAR 2000               | 12.0       | .79                        |
| BOTH                        | 33                 | CGP YEAR 2000               | 12.0       | .51                        |
| ANATOMY & PHYSIOLOGY KING   | 24                 | ACADEMIC SELF-CONCEPT SCALE | 44.7       | .20                        |
| ANATOMY & PHYSIOLOGY BAILEY | 8                  | ACADEMIC SELF-CONCEPT SCALE | 45.9       | .57                        |
| BOTH                        | 32                 | ACADEMIC SELF-CONCEPT SCALE | 45.0       | .16                        |
| BIOLOGY 103 KING            | 28                 | ACADEMIC SELF-CONCEPT SCALE | 43.3       | .18                        |
| BIOLOGY 103 BAILEY          | 38                 | ACADEMIC SELF-CONCEPT SCALE | 45.7       | .11                        |
| BIOLOGY 103 RSL             | 9                  | ACADEMIC SELF-CONCEPT SCALE | 41.1       | .70                        |
| BIOLOGY 102 KING            | 22                 | ACADEMIC SELF-CONCEPT SCALE | 40.6       | .42                        |
| ALL BIOLOGY CLASSES         | 97                 | ACADEMIC SELF-CONCEPT SCALE | 43.4       | .25                        |
| ALL CLASSES                 | 129                | ACADEMIC SELF-CONCEPT SCALE | 43.8       | .25                        |



# NORTH CAROLINA STATE UNIVERSITY AT RALEIGH

SCHOOL OF EDUCATION

DEPARTMENT OF MATHEMATICS AND SCIENCE EDUCATION  
326 POE HALL  
Zip 27650

June 12, 1979

Mr. Robert L. King  
Chairman and Project Director  
Science Department  
Southeastern Community College  
P.O. Box 151  
Whiteville, N.C. 28372

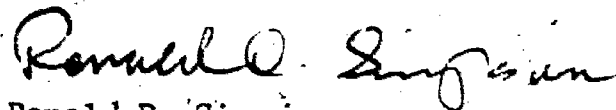
Dear Mr. King:

My visit to your campus last week, like the initial visit in January, was both enjoyable and productive. I continue to be favorably impressed by the dedication of your faculty to seek new ways to improve the offerings of the Department of Science at SCC. Much progress has been made since January and it appears that the current NSF project will lead to several significant changes for next year.

The observations I reported to you in January are still valid and I shall not repeat those in this report. For the most part, the recommendations I made in January are also still germane to current discussion. However, our meeting last week afforded us an opportunity to develop further many of the issues and ideas that emerged in January and it is those topics I will focus on in this report.

I trust that my work with your staff, along with this final report, will be of value as you complete your current project and plan for the future. If I can be of further assistance please do not hesitate to call on me.

Sincerely,



Ronald D. Simpson  
Associate Professor

cc. Dr. W. Ronald McCarter  
Mr. Walter Brown  
Mrs. Phyllis Feagin  
Miss Lois Bailey  
Mr. Marion Martin  
Mrs. Emily Owens  
Mrs. Winnie Cooke  
Ms. Donna Scott

RDS/ts

## CONSULTANT'S FINAL REPORT

The following report was submitted by Dr. Ronald D. Simpson, North Carolina State University, after a two-day visit to campus, June 4-5, 1979.

"In preparing this report it is felt that the observations and recommendations contained in my initial report of January 1979 are still valid, and for the most part, should be considered while planning for changes within the science curriculum at SCC. This report, as one would expect, develops further some of the earlier recommendations. The major thrust of this report, however, is based largely on data that have been analyzed since January, interviews conducted during the June visit, and a lengthy meeting with Science Department personnel during this visit.

### "FINDINGS AND RECOMMENDATIONS

"Correlational studies between various standardized instruments and student achievement in biology at SCC have been very useful in attempting to predict academic success. These should be continued next fall. In addition to the tests already administered to incoming students by the Counseling Center (i.e., reading and English comprehension), the following should be considered:

- The new proposed wide-range aptitude test in mathematics (WRAT)
- The Year 2000 Test
- Cognitive Diagnostic Test
- Brookover Scale of Academic Self-Concept

"Scores from each of these instruments should be correlated with final grades in Biology 101 at the end of Fall quarter, 1979. In addition to standard correlation procedures, a stepwise, multiple-regression analysis should be run so that the total variance predicted by these indicators can be studied in various combinations. By combining scores from reading tests, mathematics tests,

and standardized science tests, a prediction equation can be derived that may be very useful for placing entering science students at SCC. Those measures which add little or nothing to the prediction equation can then be dropped. Those tests which have subscales should be examined by sections. The Cognitive Diagnostic Test (science) can be broken down into five categories. If only one or two categories correlate highly with achievement the rest may be dropped.

"The following recommendation stems from lengthy discussion with the science faculty. At this point a valid and reliable method for placing incoming students at SCC in different science tracts does not exist. This is complicated further by the fact that a sizeable number of students either register too late to be tested for that quarter or enter at times other than the fall quarter, placing them out of sequence with some of the biology offerings. To accommodate the aforementioned problems it is suggested that a new Biology 101 course be designed for all incoming students who qualify for credit level work in science. During this course the science faculty would have an opportunity to evaluate students and recommend one of two tracts to be followed subsequent to completion of BIO 101. A diagram showing this relationship is shown below:

|             |                           |                           |
|-------------|---------------------------|---------------------------|
| Biology 101 | General Biology 102       | General Biology 103       |
|             | Biology for Majors<br>102 | Biology for Majors<br>103 |

"Biology 101 should be a concrete, high interest, low quantitative course designed to serve all ability levels. Within this course lab sections could be differentiated for 'high' and 'low' achieving students. Higher achieving students could be given independent projects, allowed to design their own laboratory investigations, or be allowed to serve as tutors for lower achieving students. The section for lower achievers could emphasize hands-on experiences, special instruction on the reading of science materials, and provide other assistance needed in order to help these students attain at least minimal success in biology.

"It should be emphasized that BIO 101 needs to be a carefully nurtured course that is given special attention. The instructor(s) should be interested in this approach and possess the necessary skills that will allow him or her to work successfully with students from varied backgrounds. No doubt, additional administrative support will need to be provided. This course should be perceived as the most critical course in the biology tract; for it will be here that students are diagnosed, recommendations are made, and attitudes are fostered that will strongly influence the student's future in science. It will be in this course that capable and highly motivated students are singled out for enrichment and placement into courses designed to properly challenge them. It will also be here that much of the current attrition in biology can be mediated. A curriculum should be developed and methods of instruction used that will maximize the potential of each student and produce in all students a more positive attitude toward biology.

"The tract labeled, 'General Biology' is recommended for those students who now take RSL courses or do not plan to enter biology or science-related fields. The alternative tract (which could also be called 'Honors Biology') is designed for students who are highly motivated in biology and earned a grade of A or B or higher in BIO 101. Several other criteria could be used, including teacher recommendations, to help place students in the appropriate tract. BIO 102 and 103 in both tracts should be reorganized and be designed to build on topics in the new BIO 101. (They should generally move from topics in Biology that are the most concrete to topics later on that are the most abstract). The two tracts should differ enough in content and approach so that they end up serving the different groups of students for which they were designed.

"It appears that to accomplish the two major recommendations a new faculty member will be needed. The heavy teaching load of current faculty members leaves little time for additional developmental activities. The new faculty member (or members) should have a strong interest in working with non-majors in science and with lower achieving students. This person should understand how to construct educational objectives, implement a variety of instructional techniques, and evaluate student progress in cognitive, skill, and attitude areas relevant to the proposed courses for non-majors.

"The question of SCI 91, a non-credit course for remedial students, has not been resolved. Assuming there is student demand for the course and a faculty member who can devote special attention to the course, it would be possible to offer such a course in the Fall of 1979. If, however, basic reading and math skills are what keep students from succeeding in Biology at SCC it would seem more feasible to have students concentrate their remedial efforts

in these areas. Also, it appears that the introductory course in physical science at SCC is successful in helping improve such quantitative skills. It was suggested by one faculty member that concentrating on the current recommendation to reorganize BIO 101, 102, and 103 would seem to be enough to tackle during the coming year.

"Future plans (including subsequent grants) for improving instruction in science at SCC should include staff development activities. Faculty should be allowed to visit other institutions where innovative science programs have been developed and are in operation. Specialists in the construction of tests, alternative instructional systems, and educational objectives should be brought to the campus for workshops. Faculty whose major responsibilities are working with slow learners and poorly motivated students should receive special instruction on how to deal with students who possess these characteristics. Faculty members in science at SCC possess strong academic backgrounds as well as positive attitudes toward improving the curriculum and their teaching effectiveness. Indications are that they would not only profit from being exposed to recent developments in instructional technology at the college level, but that they would welcome it."

/s/Ronald D. Simpson  
Associate Professor of  
Science Education  
N. C. State University



## SUMMARY AND RECOMMENDATIONS

This study has examined several aspects of science at SCC: course prerequisites, course objectives, course content, student reading levels, student attitudes, reading levels of course materials, potential placement instruments, faculty needs, and student needs. Three instruments were correlated with achievement in biology. Science faculty members were given opportunities to "step back" and analyze course offerings and formulate innovative plans. A nationally renowned science educator consulted with the faculty and staff and led discussions of curricula and placement procedures.

As a result of this study, the following recommendations are made:

- Reorganize topics in Biology 101, 102, and 103 so that they begin with high-interest, concrete subjects and progress to more technical, abstract topics
- Vary teaching methods in science to include more field trips, demonstrations, and "hands-on" activities
- Reduce teaching loads of current faculty members so they can devote time to reorganizing biology and to implementing varied teaching strategies for developmental students
- Require students reading below the ninth-grade level (as measured by the Nelson-Denny Reading Test) or placing below the skill level for English 101 (as measured by the Local English Placement Test) to remediate in these areas before taking college-credit science
- Distribute BIO 101 Prerequisites and PHS 101 Prerequisites to counselors and faculty advisors
- Develop a short, self-administered quiz for students to assess their level of skills recommended for success in 101-level sciences and distribute the quiz to counselors and faculty advisors



- Confer with reading instructors on using science to help build reading skills of students
- Confer with math department on mathematical skills prerequisite to success in 101-level sciences
- Administer the Cognitive Diagnostic Test, CGP Year 2000, and Brookover Scale of Academic Self-Concept to BIO 101 and PHS 101 students in the fall of 1979
- Administer the math section of the Wide Range Aptitude Test (WRAT) to BIO 101 and PHS 101 students if it is not done by SCC Counseling Services in the fall of 1979
- Use multiple-regression analysis to correlate achievement in 101-level science courses with scores on the Nelson-Denny Reading Test, the SCC Local English Placement Test, and the four measures mentioned above
- Develop a Science 91 in the fall of 1980 if the revamping of existing courses does not decrease failure rate and attrition rate
- Continue professional development activities of science faculty with new emphasis on improved instructional technology and on specialized techniques for science education
- Prepare and submit a proposal by November 9, 1979, to the National Science Foundation, Comprehensive Assistance to Undergraduate Science Education Program, for funding to continue evaluation and improvement of science education at Southeastern Community College
- Obtain a commitment from the college administration to provide the philosophical and financial support that innovation will require.

## APPENDICES

## APPENDICES

### APPENDIX A

GRANT PROPOSAL

NSF GRANT COMMITTEE MINUTES

INITIAL SCIENCE STUDENT PROFILE

### APPENDIX B

BIOLOGY 101, 102, AND 103 OUTLINES

PHYSICAL SCIENCE 101, 102, AND 103 SYLLABI

FRESHMAN ENGLISH COURSE DESCRIPTIONS

### APPENDIX C

STUDENT NEEDS QUESTIONNAIRE AND ANSWER SHEET

STUDENT COMMENTS

### APPENDIX D

LIST OF TESTS REVIEWED

COGNITIVE DIAGNOSTIC TEST AND MASTER ANSWER SHEET

BROOKOVER ACADEMIC SELF-CONCEPT SCALE

## APPENDIX A

NATIONAL SCIENCE FOUNDATION

PROJECT  
SUMMARY

Name of Institution (NSF Directory Name)

Southeastern Community College

Address of Institution (Include  
Branch/Campus & Components)

P. O. Box 151  
Whiteville, N. C. 28472

Principal Investigator

Mr. Robert King

Division (Office) and Directorate

Science Education Development & Research

Section

Research in Science Education

Program

Local Assessment of Science Education  
for the Two-Year College

Title of Project

Assessment of Placement Needs of Students

Summary of Proposed Work (Limit to 22 Pica or 12 Elite typewritten lines)

The major objective of this proposal is to develop a needs assessment document to accurately place students in Science courses. The project plan includes: (1) Identification of goal areas; (2) Select and develop measures for these goals; (3) Set acceptable levels on the measures; (4) Administer the measures; (5) Compare obtained levels against acceptable levels; (6) Assess the priorities among needs for the purpose of defining action programs; and (7) Determine feasibility of initiating programs to eliminate need. The anticipated outcomes of this project are to accurately place students in Science courses according to their needs and learning levels by: (1) Identifying freshmen who are below the acceptable level for beginning Science courses; and (2) Determining what instructional methods, learning experiences, and required resources best carry the content for students placed in the developmental courses.

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BUDGET

|   | <u>Original</u> | <u>Amended</u> |
|---|-----------------|----------------|
| A. Salaries and Wages   |                 |                |
| 1. Project Director   | -0-             | -0-            |
| 2. Professional Staff   | -0-             | -0-            |
| 3. Principal Investigator<br>19 person weeks X \$200/week         | \$3,000         | \$3,800        |
| B. Staff Benefits<br>6.13% X \$3,800                              | <u>594</u>      | <u>233</u>     |
| C. Total Salaries, Wages and Benefits                             | 3,594           | 4,033          |
| D. Supply and Communication Costs                                 | 200             | 200            |
| E. Report and Publication Cost                                    | 231             | 92             |
| F. Consulting Fees<br>\$75/day X 7 days                           | 375             | 525            |
| G. Travel & Subsistence   |                 |                |
| 1. Consultant - 2 trips X \$75                                    | 250             | 150            |
| 2. Project Staff  | 250             | -0-            |
| H. Other Direct Cost<br>Computer Time                             | 100             | -0-            |
| I. Total Direct Cost  | 5,000           | 5,000          |
| J. Indirect Cost  | <u>-0-</u>      | <u>-0-</u>     |
| K. Total Project Cost   | 5,000           | 5,000          |
| L. Local Contribution   |                 |                |
| Administration, Faculty and Staff<br>22 person weeks X \$250/week | 5,500           | 5,500          |
| M. NSF Request  | 5,000           | 5,000          |

**NARRATIVE  
SECTION 5**

**A. Description of Institution:**

Southeastern Community College endeavors to meet the educational development and personal growth needs of the citizens in our service area. The following statement of purpose of the college defines the institutional mission as the college relates to the community:

Southeastern Community College, a comprehensive community college, exists to "open the door" to a variety of educational opportunities at low cost for all in the community who can profit by them. The Community College, as a component of democracy, recognizes that many different individuals comprise the community and have varied backgrounds, interests, abilities, financial resources, career choices, and other needs. The college recognizes the need for appropriate functions to help each individual to develop to the ultimate extent of his abilities, needs, and goals consonant with the needs of society. The college will provide opportunities for the individual student to: understand his biological and physical environment and his place within it; maintain sound mental and physical health for himself and community; refine attitudes and values; exercise the privileges and responsibilities of citizenship; and achieve maturity in all areas.

Southeastern Community College has expressed its mission in broad purposes through the following specific elements:

- Comprehensive educational programs
- A focus on meeting individual needs
- Service to the community
- Openness and accessibility
- Preparation for employment and/or continued education
- Development of student potential by assisting students to build on their strengths while at the same time improving their weaknesses

These descriptions are indicative of comprehensive community college values and are the foundation upon which the education programs have been developed for Southeastern Community College.

In order to fulfill purposes, Southeastern Community College does:

- Provide two years of college programs acceptable for transfer to a four-year college or university.
- Provide occupational programs which will prepare the students for employment.
- Provide suitable courses and programs for adults who desire to further their formal education and improve their personal productivity.
- Provide counseling and other guidance services to enable students to identify and perform effectively in programs suited to their abilities, interest, experience, and goals.

- Provide leadership and opportunities for the fostering of cultural development in the community.

Successful implementation of an "open-door" admissions policy requires a board curriculum to take into consideration the wide differences in abilities and interests of students. In order to fulfill the institutional objectives stated previously, the college has four divisions:

- College Transfer Division
- The Occupational Education Division
- The Adult Extension Education and Continuing Education Division
- Student Development Center

The majority of students that attend Southeastern are "first generation" college students. They come to us with weak backgrounds academically and socio-economically. The median school years completed in the service area of the college is 9.1, as compared to the national average of 11 school years. Also, 13,976 families (28.3%) in the service area have an average mean income of only \$2,008. It is from these families that we acquire a large percent of our students.

The Southeastern Community College attendance area includes Columbus, Robeson, Bladen, Brunswick, New Hanover, and Pender Counties. This region is located in the rural coastal plain of southeastern North Carolina. The population of this region includes 175,000 white, 79,900 black, and 28,500 Indian persons (1976 Cape Fear Council of Governments).

The racial mix of the 1,893 student body includes 71% white, 26% black, and 3% Indian. The median age of our students is 28. Thirty-six percent of the total student body are married, supporting a family. Forty-seven percent of the parents of our students earned less than \$8,000 during the last calendar year. Also 52% of the students' parents have not completed high school.

Southeastern Community College offers the Associate in Science Degree that requires 24 quarter hours of science courses and the Associate in Arts Degree that requires 12 quarter hours in science courses. Courses offered in the Science Division include Biology, Chemistry, Physical Science, General Physics, and Botany. The total head count enrolled in the Science Division during Fall Quarter was 714.

B. Rationale for Subject Area:

The students enrolling at Southeastern are far below the national average in educational achievement. The College Guidance and Placement Inventory administered to all freshmen in Fall Quarter of 1977 indicated that 77% fell within the bottom quartile on the English portion using national standards. The students' performance in reading and math were comparable.

The college has done much to assist its students as they work to overcome severe educational handicaps. The concern of this proposal is the correct placement in Science courses of the developmental student. The "developmental student" at our institution is defined as one who has the potential of succeeding in the college transfer or technical programs, if the learning environment is structured to meet individual needs.

In a FIPSE funded evaluation report to the President of the college from Dr. Louis W. Bender, Evaluation Consultant from Florida State University, Dr. Bender recommends: 1) The need to expand effective educational opportunity to those students not adequately served by the system; 2) Lack of "fit" between the skills, knowledge, and attitudes taught by post-secondary education institutions and those needed by many individuals to be effective and productive members of society; and 3) The need to improve programs, personnel, and instruction for more effective education to serve these students.

At the present time all freshmen are enrolled in a "101" Science course at the beginning of fall quarter. Departmental pre-tests are administered to the students to determine their knowledge level. Students who score below the cut-off level are requested to enroll in a developmental Science course to increase their knowledge level to the beginning "101" Science course.

The system presently used is a haphazard method of determining proper placement of students. The important characteristics of the student group is not known. Also the pre-test is not valid or reliable. The pre-testing does not provide information about the type of instructional methods, learning experiences, and content level required for developmental students.

A more reliable system of evaluation needs to be developed for identification and placement of developmental students in Science courses according to their needs and

and learning levels. The major objective of this proposal is to develop a needs assessment document to accurately place students in Biology 91, a development course. After the procedure is tested, it will be implemented for placing beginning students in Physical Science and Chemistry.

#### C. Plan for Conducting Needs Assessment

The curriculum design plan is applicable for treating concepts, topics, or units as part of a curricula. This design can be applied to an individual curriculum or course development, initially involving only a few teachers. Then, with experience it may be expanded to an entire department; and eventually to a total school program.

The plan for conducting the needs assessment evaluation and the format of the report is as follows:

1. Identify the goal areas considered important to the Science Division as it relates to goals of the college.
2. Select and/or develop measures (indicators) for these goal areas.
3. Set acceptable levels on the measures.
4. Administer the measures.
5. Compare obtained levels against the acceptable levels. If the obtained levels are less than the acceptable levels, a need is indicated.
6. Assess the priorities among needs for the purposes of defining action programs.
7. Determine feasibility of initiating programs to eliminate need.

#### D. Project Plan

The project plan, personnel for each task, and time period to accomplish the project are as follows:

Task #1 - Statement of general purpose for the topic to be treated.

Personnel - Project Director, Science Faculty, Academic Dean

Time Frame - June 1 - 9

Task #2 - Enumeration of important characteristics of student group for which evaluation will be designed.

Personnel - Project Director, Student Development Center Staff

Time Frame - June 9 - July 31



Task #3 - Listing of the learning objectives stated in terms of measurable student behavior outcomes students should already know about the topic.

Personnel - Project Director, Science Faculty, Director of Resources for Student Learning Program

Time Frame - June 15 - July 7

Task #4 - Listing of factual subject content that supports each object.

Personnel - Project Director, Science Faculty

Time Frame - July 7 - 31

Task #5 - Development of pre-tests to determine how much students already know about topic.

Personnel - Project Director, Science Faculty, Director of Resources for Student Learning Program, Consultant

Time Frame - August 1 - 31

Task #6 - Determining requirements for budget, administrative, and support services to carry out the assessment plan.

Personnel - Project Director, Science Faculty, Academic Dean, Dean of Student Development

Time Frame - August 14 - 25

Task #7 - Administration of pre-tests to evaluate student knowledge in terms of the objectives.

Personnel - Project Director, Science Faculty, Student Development Center Staff

Time Frame - September 5 - 8

Task #8 - Analyzing and summarizing data to determine action to be taken.

Personnel - Project Director, Research and Evaluation Staff, Consultant

Time Frame - September 11 - 29

Task #9 - Administration of post-test to evaluate student knowledge in terms of the objectives.

Personnel - Project Director, Science Faculty

Time Frame - November 11 - 13

Task #10 - Analyzing and summarizing pre- and post-test data to determine action to be taken.



**Personnel - Project Director, Research and Evaluation Office, Consultant**

**Time Frame - November 13 - 30**

**Task #11 - Selection of instructional methods, learning experiences and required resources to best carry the content for student placed in the developmental course. (If need indicated)**

**Personnel - Project Director, Science Faculty, Learning Resource Center Staff, Consultant**

**Time Frame - September 15 - December 31**

**Task #12 - Plans for revising any phases of the project.**

**Personnel - Project Director, Science Faculty, Academic Dean**

**Time Frame - December 4 - 11**

**Task #13 - Completion of assessment document, responding to the outcomes of the needs study and resulting plans for future action.**

**Personnel - Project Director, Science Faculty, Academic Dean, Consultant**

**Time Frame - December 15 - February 1**

The personnel involved in the project plan grouped according to task and time are as follows:

| <u>PERSONNEL</u>                                | <u>TASKS</u>           | <u>PERSON/WEEKS</u> |
|---|------------------------|---------------------|
| 1. Project Director                             | 1 - 13                 | 10                  |
| 2. Science Faculty                              | 1,3,4,5,6,7,9,11,12,13 | 7                   |
| 3. Academic Dean                                | 1,6,12,13              | 2                   |
| 4. Student Development Center Staff             | 2,6,7                  | 3                   |
| 5. Resources for Student Learning Program Staff | 3,5                    | 2                   |
| 6. Consultant                                   | 5,8,10,11,13           | 1                   |
| 7. Research and Evaluation Staff                | 8,10                   | 4                   |
| 8. Learning Resource Center Staff               | 11                     | 4                   |

PERSONNEL  
SECTION 6

Project Director/Principal Investigator

The Project Director/Principal Investigator of this proposal is Mr. Robert King, Chairman of the Science Division. A brief description of Mr. King's qualifications follows in his resume. The project responsibilities of Mr. King have been stated in the narrative section of the project plan.

Science Faculty

The Science Faculty to assist in this project are Mr. Marion Martin and Ms. Lois Bailey. A brief description of their qualifications follows in these resumes. The project responsibilities of the faculty have been stated in the narrative section of the project plan.

RESUME

Robert L. King

EDUCATIONAL BACKGROUND

A. B. - Elon College - 1960

M. A. - Appalachian State University - 1961

POST GRADUATE WORK

Arizona State University - 1966

University of New Mexico - 1967

Duke University - 1968

N. C. State University - 1974

Courses and Institutes

FULL AND SHORT COURSES

Seminar in Desert Biology - 1966

Atomic Nuclear Physics - 1967

Radiation Biology - 1967

Marine Ecology - 1968

Marine Invertebrate Zoology - 1968

Institute in Genetics (N. S. F.) - 1967

Community College Systems - 1974

Seminar in Human Affairs - 1974

UNPUBLISHED RESEARCH PAPERS

"The Comparison of Marine Fishes in Three Biogeographical Provinces Off the N. C. Coast"

"Movement in Narsarius Obsoletes"

EXPERIENCE

4 years - College of the Albemarle  
Elizabeth City, N. C. - Assistant Professor Biology - 1961

12 years - Southeastern Community College  
Whiteville, N. C. - Professor and Chairman Science Division - 1965

RESEARCH EXPERIENCE

USDA - Witchweed Laboratory - 1962

N. C. State College - Research Institute - 1963

James Marion Martin - Resume  
102 Ole Farm Train, Rt. # 7  
Whiteville, N. C. 28472  
Chemistry -Physical Science - Physics Instructor  
Southeastern Community College  
Whiteville, N. C. - 28742

### EDUCATIONAL BACKGROUND

A. B. Duke University - 1938

40 SH Physical Sciences  
26 SH Biological Sciences

A. M. Duke University - 1941

Administration

#### Post Graduate Work

Duke University - 1941

10 SH Chemistry

Univ. of Virginia - 1941

8 SH Chemistry

Univ. of N. C. CH - 1942

1.5 SH Chemistry

Duke University - 1950

6 SH English

Univ. Of N. C. CH - 1957

6 SH Science Education

Univ. of N. C. CH - 1962

6 SH Chemistry

New Mexico Highlands

Univ. - 1963

4 SH Chemistry

Univ. Chattanooga - 1964

6 SH Chemistry

Univ. California - 1965

2 SH Chemistry

2 SH Physics

2 SH Botany

### AMERICAN CHEMICAL SOCIETY SHORT COURSES

Gas Chromatography - 1970

Column Selection in Gas Chromatography - 1970

Intermediate Gas Chromatography - 1971

Modern Liquid Chromatography - 1972

Modern Methods of Drug Analysis - 1973

Interpretation of NMR Spectra - 1974

### N. C. STATE UNIVERSITY SHORT COURSE

Nuclear Electrical Power Generation - 1975

## HONORS

Award of Excellence in Teaching - American Institute of Mining,  
Metallurgical, and Petroleum Engineers  
Outstanding Educators of America  
International Dictionary of Biography  
Who's Who in North Carolina  
Who's Who in The South  
Who's Who in America  
Outstanding Americans

## PROFESSIONAL ORGANIZATIONS

N. C. Academy of Science  
American Assn of Science Teachers  
American Chemical Society  
NEA  
NCEA  
AAUP  
ATOS  
AGO

## TEACHING EXPERIENCE

3 Years - Ellebe Progressice School, Ellbe, N. C. -  
Chemistry, Physics - 1938  
4 Years - Oak Ridge Military Institute (Jr. College), Oak Ridge, N. C.  
Science Supervisor - Chemistry - 1941  
21 Years - Whiteville City Schools, Whiteville, N. C.  
Science Supervisor - Chemistry - 1946  
11 Years - Southeastern Community College, Whiteville, N. C.  
Chemistry - Physical Science - Physics - 1967

## PUBLICATIONS

Audio Tutorial Systems Approach to Physical Science - TAP Publications  
Material has been used at:  
Manchester Community College - Conn.  
Tri-County Technical Inst. - S. C.  
Southeastern Community College, - N.C.

## CIVIC CLUBS

Whiteville Rotary Club

## CHURCH AFFILIATION

Whiteville Methodist Church

## RESUME'

Lois Elaine Bailey

### EDUCATIONAL BACKGROUND

B. S. - Wake Forest University - 1960

M. A. T. - University of North Carolina at Chapel Hill - 1966

Post-Graduate - University of North Carolina at Chapel Hill - 1973

### PROFESSIONAL EXPERIENCE

7 years - Southeastern Community College  
Whiteville, N. C. - Botany, Zoology,  
Health Sciences - 1970

1 year - Columbus County Department of Social Services  
Whiteville, N. C. - Social Worker - 1969

7 years - Columbus County Board of Education  
Whiteville, N. C. - Science teacher - 1962

2 years - Camp Lejeune Dependent's School  
Jacksonville, N. C. - Science teacher - 1960



**CURRENT OR PROPOSED PROJECTS  
SECTION 7**

There are no current or proposed projects to which the personnel have committed a portion of their time. Also, there are no proposed projects which are being considered by, or which will be submitted in the near future to, other possible sponsors including other Foundation programs.

May 2, 1978

M E M O R A N D U M

TO: Science Department Members

FROM: Bob King *BK*

SUBJECT: Committee meeting on NSF Grant entitled Local Assessment of Science Education in the 2 year college (Assessment of Placement Needs of Students) for SCC

Members Present: Dean Paulsen, Marion Martin, Winnie Cooke, Lois Bailey  
Bob King, and Orville Culpepper

The first meeting of the NSF Grant Committee met on April 27, 1978 in C-112 at 9:00 a.m. - 10:30 a.m. At this time a flow chart was presented and discussed (see attachment). The question was raised and discussed concerning the Research Office's part in providing a student profile. Mr. Culpepper indicated a priority form would have to be filled out. Mr. King and Mr. Culpepper agreed to complete the necessary forms and determine the course of action.

Dean Paulsen pointed out that as soon as we were more organized in our direction we could pursue the Administrative Council for the decision process.

Faculty participation was urged. Faculty members agreed to begin thinking in terms of goals and objectives for the 91 level. At the next meeting, Mr. Culpepper will be able to present some indications on the process of the Research Office. It was suggested that counselors attend the next meeting.

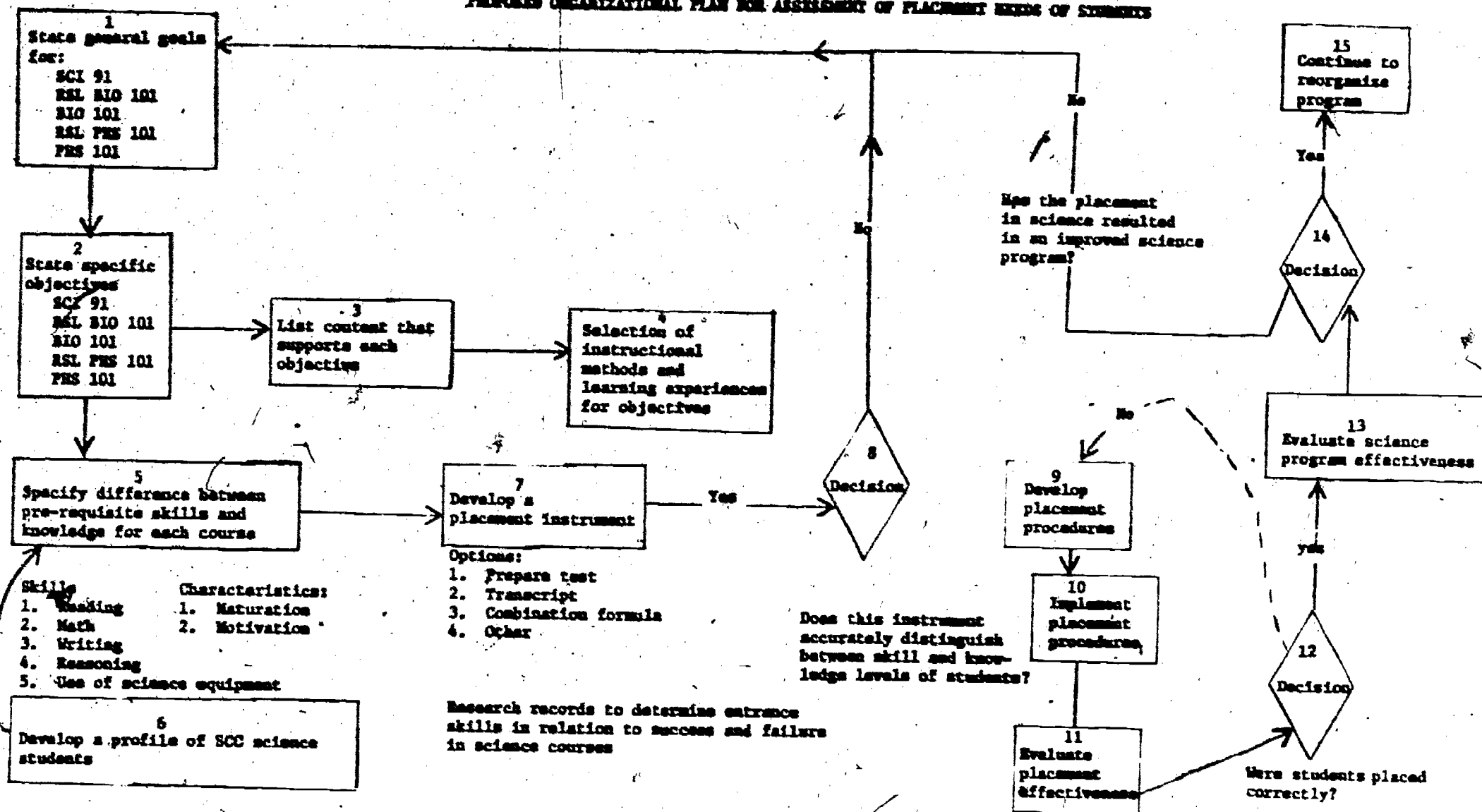
The next meeting will be held on Thursday, May 4, 1978 at 9:00 in C-112.

gre

Attachment

cc: Dr. McCarter  
Vincent Sweet  
Julie Stocks  
Mr. Walter Brown

# PROPOSED ORGANIZATIONAL PLAN FOR ASSESSMENT OF PLACEMENT NEEDS OF STUDENTS



May 8, 1978

MEMORANDUM

TO: Science Department Members

FROM: Bob King *B.K.*

SUBJECT: Committee meeting on NSF Grant entitled Local Assessment of Science Education in the 2 year college (Assessment of Placement Needs of Students) for SCC

Members Present: Marion Martin, Winnie Cooke, Orville Culpepper, and Bob Young

The second meeting of the NSF Grant Committee took place on May 4, 1978 from 9:00 a.m. to 10:00 a.m. At this time Orville Culpepper indicated that he had the approval to proceed with the research and that he had ample help. He also indicated that he should have a profile for students expecting to enroll at SCC on or before May 31.

Goals and objectives for all levels were briefly discussed. The overall goals for Physical Science and Science 91 will be presented at the next meeting. At that time everyone could have an opportunity to react to goals set. Mrs. Cooke pointed out the need for each course's objectives and goals to be specified for each level. She also pointed out the need for each discipline to be interconnected with the next level.

Some discussion centered around designing a test that would incorporate the qualities of motivation, reasoning ability and math skills. It was felt that such qualities should be given ample consideration. Winnie Cooke agreed to look for a test that could measure motivation.

It was felt that after the next meeting we should contact the Administration on the use of consultants.

gre

cc: Dr. Paulsen  
Mr. Brown  
Dr. McCarter

## MEMORANDUM

DATE: May 19, 1978  
TO: Members of the Science Department  
FROM: Bob King B.K.  
SUBJECT: Committee meeting on NSF Grant entitled Local Assessment of Science Education in the 2 year college (Assessment of Placement Needs of Students) for SCC

Members Present: Marion Martin, Winnie Cooke, Orville Culpepper, Lois Bailey, and Bob Young

The third meeting of the NSF Grant Committee occurred on May 11, 1978 in the Science Building.

A brief explanation of data collected to date was presented by Orville Culpepper. He indicated that a sample of 50 students transcripts and placement scores were obtained. From this data he felt sure a preliminary profile could be developed. He also indicated that a May 31st completion date was possible.

Lois Bailey presented the goals for Science 91 and explained that exit criteria for 91 would be entrance requirements for 101. They are as follows:

1. A 9th grade minimum reading and comprehension level
2. Capable of arranging events in a logical series
3. Ability to understand the relationship between cause and effect.
4. Mathematical competency in decimals, addition, subtraction, multiplication, and division.
5. Sufficient self-discipline to:
  - a. complete laboratory assignments in an "open lab" situation
  - b. spend adequate time to prepare for class lectures
  - c. attend class promptly and regularly
  - d. communicate with instructor when problems arise

Members of the Science Department

Page 2

May 19, 1978

It was suggested that when 91 is developed that science faculty would spend time with the class to become familiar with students, so that the transitions to regular classes might be more smoothly.

Mrs. Cooke briefly discussed several tests for determining motivation. Those found were too lengthy. She agreed to search for one that would be suitable for our needs. Orville Culpepper suggested that we look at the Science II test located in Counseling Services.

Everyone agreed we should try to determine the specific goals for the consultant at our next meeting. Mr. King reported on a conversation with Dr. Paulsen. Dr. Paulsen suggested that we look at the consultant form in the faculty handbook.

The next meeting will be held on Thursday, May 25, 1978 at 9:00 in C-112.

gre

cc: Dr. Paulsen

INITIAL STUDY - SCIENCE STUDENT PROFILE

Office of Research and Evaluation

SOUTHEASTERN COMMUNITY COLLEGE  
WHITEVILLE, NORTH CAROLINA

May 1978



## PREFACE

This initial study's intention is to indicate the likely profile of a potentially successful student enrolling in scientific courses at Southeastern Community College (SCC). As part of the National Science Foundation's grant requirements, this initial study is expected to aid in the proper science course placement for incoming students, i.e., whether to enroll a student in a general biology, physical science, chemistry course, or a remedial course.

## METHOD

A list of current science students' names was acquired from the science department, and approximately fifty names were chosen randomly from that list. Additionally, copies of high school transcripts and SCC placement test scores were obtained in order to compare what had been done academically at the high school level, the college level, and on placement tests. These comparisons were analyzed to arrive at the results found in this study.

### ACKNOWLEDGEMENT

The Research and Evaluation Office would like to acknowledge the tremendous help given by Ms. Gale Evans, secretary to the Science Department, in the laborious acquisition of name lists, high school transcripts, and current science student SCC grades from the last two quarters. This information could only be acquired by pulling individual folders and making copies of the required material.

Many thanks to Ms. Evans.

## RESULTS

The fifty names chosen randomly from the student rosters of the last two quarters revealed that nine (9), or 18%, were A students in high school, fifteen (15), or 30% were B students, seventeen (17), or 34%, were C students and nine (9), or 18%, were D students. These grades were obtained by averaging numerical grades received in English, Math, Biology, and in some cases, Chemistry.

Those students making an A or B average in high school, for the most part, scored above average or average with the SCC placement tests. Their scores in Reading, English, and Math were in the range of 50 and above.

Age, which may have some bearing on maturity, was not a significant factor in the random sampling for our study. The ages of the students ranged from 19 years to 24 years, and the younger students did as well with their grades as the older students.

The following tables and general conclusions may serve as a tentative profile of characteristics for the successful placement of incoming students who wish to pursue science courses and/or curriculum.

Table I shows a general profile of a student who is most likely to succeed in any science course and not need any remedial help.

TABLE I

### SUCCESS WITH SCIENCE COURSES

| High School<br>Grade Average | Age       | SCC Placement Test<br>Scores Range |
|------------------------------|-----------|------------------------------------|
| A or B                       | No Factor | 70 and above                       |

Table II shows a profile of a student who has average high school grades and who has some difficulty with the SCC placement tests. This student may or may not succeed with Resource Student Learning (RSL) aid.

TABLE II

PROBABLE SUCCESS WITH RSL AID IN SCIENCE

| High School Grade Average | Age       | SCC Placement Test Scores Range |
|---------------------------|-----------|---------------------------------|
| C                         | No Factor | 50 - 69                         |

Table III shows a student who was below average in high school grades and most likely will score below the norm in the SCC placement test scores. This student should only be allowed to take 91 level remedial courses and if no progress is shown there, then channeled into another more suitable curriculum.

TABLE III

NOT LIKELY TO SUCCEED IN SCIENCE COURSES

| High School Grade Average | Age       | SCC Placement Test Scores Range |
|---------------------------|-----------|---------------------------------|
| D                         | No Factor | 49 and below                    |

CONCLUSION

The foregoing tentative findings are academic. Those students who show capability at an early age will most likely succeed in any discipline - if they want to succeed. However, since it is quite difficult to measure motivation, the technique of personal interview may shed more light on probable

success of a student in science if the aforementioned profiles apply.

Since this is only an initial try to obtain a correct and meaningful profile of a successful science student, other criteria such as a science aptitude test may prove appropriate.

# SCC SCIENCE STUDENT PROFILE

Grade Distribution for Fall & Winter '77-'78  
N = 47

A's = 5

A & B = 2

B's = 6

B & C = 9

C's = 16

C & D = 2

D's = 2

D & F = 2

F's =  $\frac{0}{47}$

27.7% = B and Above

63.8% = B & C to C & D

8.5% = D and Below

## GGP Scores

N = 19

Above 50% = 11

Below 50% =  $\frac{8}{19}$

## Reading Score

N = 20

Above 50% = 9

Below 50% =  $\frac{11}{20}$

## Student's Grades

### Above 50%

A's = 2

B's = 5

C's = 4

D's =  $\frac{0}{11}$

### Below 50%

A's = 1

B's = 2

C's = 4

D's =  $\frac{1}{8}$

## Student's Grades

### Above 50%

A's = 3

B's = 1

C's = 4

D's =  $\frac{1}{9}$

### Below 50%

A's = 1

B's = 1

C's = 9

D's =  $\frac{0}{11}$



### CONCLUSION

Based on available data, no significant correlations can be drawn from comparison of CGP and reading scores to grade performance of SCC science student. Review of high school transcripts in terms of grades and course preparation seem to serve as a better predictor of student success.

APPENDIX B

SYLLABUS  
Biology 101 - Winter Quarter - 1978-79  
Instructors: King & Bailey  
Lab Instructor: Owens

| DATE                           | TOPIC   | PAGES IN TEXT      | LAB          |
|--------------------------------|---|--------------------|--------------|
| November 29<br>December 6      | Introduction & Metric System                      | 56<br>588-589      | Tape 1       |
| December 8-13                  | The Microscope                                    | 58                 | Tape 2       |
| December 15-20                 | Cell Structure and Function<br>Cellular Transport | 52-72<br>32-36     | Tape 3       |
| January 2-5                    | Chemistry of Life                                 | 23-32<br>38-52     | Tape 4       |
| January 8-10                   | Enzymes   | 52-54<br>77-87     | Tape 5       |
| January 12-17                  | Cellular Respiration                              | 98-107             | Tape 6       |
| January 19-24                  | DNA, RNA, Protein Synthesis                       | 162-182            | Tape 8       |
| January 26-<br>February 1      | Mitosis   | 111-120            | Tape 7       |
| February 3-8                   | Categorizing the Living World                     | 205-253            | Tape 22      |
| February 10-15                 | Bacteria & Viruses                                | 208-211<br>183-186 | Bacteriology |
| Departmental standardized exam |   |                    |              |

TEXT: Invitation to Biology by Curtis

OUTSIDE READING: The Double Helix by Watson

Open Lab Hours: T-Th - 8:30 - 4:00  
F - - 8:30 - 2:30

SYLLABUS  
 BIO 102 - Spring Wuarter, 1978  
 Instructor: Bailey  
 Lab Instructor: Owens

| DATE                  | TOPIC                           | PAGES IN TEXT          | LAB             |
|-----------------------|---------------------------------|------------------------|-----------------|
| March 8-16            | Male Reproductive System        | 326 - 329              | #12             |
| March 17-23           | Female Reproductive System      | 330 - 335              | #12             |
| March 28-30           | Cleavage & Embryology           | 335 - 345              | #12a            |
| March 31 -<br>April 6 | The Nervous System              | 322; 346-<br>356       | #16             |
| April 7 - 13          | The Sensory Organs              | 411 - 426              | Sense Organ     |
| April 14 - 20         | The Endocrine System            | 356 - 363              | #16a            |
| April 21 - 27         | The Digestive System            | 388 - 397              | Digestion       |
| April 28 -<br>May 4   | Respiratory & Excretory Systems | 376 - 387<br>398 - 410 | #18             |
| May 5 - 11            | The Circulatory System          | 364 - 375              | #19             |
| May 12 - 18           | Frog Dissection                 |                        | Frog Dissection |
| May 25                | 8:00 - 10:00 a.m.               | EXAM                   |                 |

TEXT: Invitation to Biology by Curtis

Open Lab Hours : Tuesday - 8:30 - 7:00 p.m. - C101

Wednesday - Friday - 8:30 - 4:00 p.m.

All BIO 102 students must complete lab tests by 4:00 p.m. on Thursday each week.

Quizzes will be announced one week before they are given

Absence from an announced quiz must be cleared in advance

Each student is required to attend lab each week. There are no make-up labs. Being late for class 3 times may be counted as an absence. A warning notice for excess absences will be sent to parents when a student misses 3 lectures. Additional absences may result in the student's name being removed from the roll. In such a case, a grade of "F" will be recorded after mid-term.

The grading scale used is:

A = 90 - 100  
B = 80 - 89  
C = 70 - 79  
D = 60 - 69  
F = 0 - 59  
I = Incomplete

Lecture test grades-----50%  
Lab average-----25%  
Exam-----25%

Syllabus  
BIOLOGY 103 - Spring Quarter, 1978  
Instructors: King & Bailey  
Lab Instructor: Owens

| WEEK                           | LAB AND LECTURE TOPIC   | PAGES IN TEXT                                |
|--------------------------------|---|--|
| March 8 - 17                   | Meiosis   | 121 - 129                                    |
| March 20 - 23                  | Heredity I  | 130 - 140                                    |
| March 28 - 31                  | Heredity II   | 141 - 161                                    |
| April 3 - 7                    | Heredity III  | 194 - 201                                    |
| April 10 - 14<br>April 17 - 21 | Plant Reproduction and Behavior<br>Stems & Roots              | 283 - 290; 291 - 313<br>267 - 282; 291 - 298 |
| April 24 - 28                  | Leaves & Photosynthesis                                       | 259 - 266                                    |
| May 1 - 5                      | Animal Behavior   | 527 - 555                                    |
| May 8 - 12                     | Ecology   | 481 - 526                                    |
| May 15 - 22                    | Evolution and Origin of Man                                   | 431 - 439<br>559 - 584                       |
| May 24<br>May 23               | 8:00 - 10:00 a.m. - BIO.103 A<br>5:00 - 7:00 p.m. - BIO 103 C | EXAM<br>EXAM                                 |

TEXT: Invitation to Biology by Curtis

Open Lab Hours (C101) - 8:30 - 7:00 p.m. - Tuesday  
8:30 - 4:00 p.m. - Wednesday - Friday

A warning notice for excess absences will be sent to parents when a student misses 3 lectures. Additional absences may result in the student's being removed from the roll. In such a case, a grade of "F" will be recorded after mid-term.

(OVER).



The grading scale is:

A 90 - 100  
B 80 - 89  
C 70 - 79  
D 60 - 69  
I 0 - 59  
I Incomplete

Lecture test grades -----50%  
Lab average -----25%  
Final Exam -----25%

Students must attend lab each week. There are no make-up labs.

FALL QUARTER

SYLLABUS ..... PHYSICAL SCIENCE 101

AUDIO-TUTORIAL OF SELF INSTRUCTIONAL LEARNING  
METHODS

We hope that you are going to enjoy learning by Audio-tutorial methods. You will find that this method of instruction puts the total responsibility of learning on you the student, allowing you to move at your own rate of speed. IT IS EASY TO GET BEHIND AND DIFFICULT TO CATCH UP. Stay on schedule. You will find an instructor is nearby to help you if you have difficulty. Do not hesitate to ask for assistance, however do not expect the instructor to do your work for you. You are here because you really desire to learn. Do your best to do so. The course is so dovetailed that if you miss doing one single part, it will become obvious on the unit test.

You are required to attend one of the two general class sessions each week. Your attendance will be taken by your placing the numbered attendance slip which you will find in each package in the box on the desk in the lecture room. NO OTHER FORM OF SHOWING YOUR PRESENCE WILL BE ACCEPTED!

At the lecture you will be given general information; see films, demonstrations, and you may ask questions about things which may disturb you. Then you will be on your own, attending the learning laboratory in room C102 at any time the room is open for your use. SEE THE SCHEDULE ON THE OUTSIDE DOOR TO THE ROOM. PLEASE DO NOT ENTER NOR LEAVE THE LEARNING LAB THROUGH THE INSTRUCTORS' OFFICE. USE THE OUTSIDE DOOR!

Clock in with the time clock, listen to the lecture tape and answer the questions on your practice sheets. Do the problems and the discussion questions. Then after taking the post test move on to a laboratory table. ALWAYS LISTEN TO THE LAB TAPE BEFORE YOU BEGIN ANY EXPERIMENT. you will find that this will save you much time in the long-run. You are held responsible for the laboratory work, and it will count 10% of your weekly grade. Questions on this work will also appear on the unit test.

In the laboratory you may work with a partner of your own choice. However a partner means ONE PERSON. There is to be no loud talking in the lab. Other people are trying to work- give them a chance. When you have finished your package, turn it in to Mrs. Berrisoff in the prep room next to 102. You will be given a test question sheet and a machine graded answer sheet. You may mark all over the question sheet, but make no marks on the answer sheet. The questions must be answered with a PENCIL. If you erase do a clean job of it. If you use ink the machine will give you a 0. Be sure that you put both the package number and the test letter on the answer sheet along with your name. (John Jones - Package No. 3, Test D-R). Return both the test sheet and the answer sheet to Mrs. Berrisoff, and she will give you your next package. When you have finished check out.

Your test grade will be posted on the back of your time card in Mrs. Berrisoff's office in about 4 hours from the time you have taken the test. Please allow 4 hours before you ask Mrs. Berrisoff why your grade is not on the card.

BE SURE TO SIGN YOUR TIME CARD ON THE BACK SIDE WHEN YOU FIRST CHECK INTO THE LAB. IF YOUR CARD IS NOT SIGNED YOU WILL GET NO CREDIT FOR THE COURSE.

DO NOT ASK FOR YOUR TEST TO BE GONE OVER WITH YOU ON THE DAY THAT PACKAGES CLOSE OUT. At any other time we will be most happy to go over test with you.

If you do not make a passing grade on your test, you may go over the test with the instructor and take it one more time. If you wish to try for a higher grade than the one you first made you also take the test a second time. The highest grade made is the one you will get.

The time necessary to complete a package is given on the cover of each package. You are required by N. C. law to spend 360 minutes each week in the learning lab as evidenced by your time card. Failure to do so may result in your being dropped from the course.

The instructor and laboratory assistants are available to you for help. Please feel free to come into the instructors office for help when you have questions and need assistance. For comfort and convenience of all, there is to be NO FOOD, DRINKS, OR SMOKING IN THE SCIENCE LEARNING LAB.

#### SOMETHINGS YOU CAN DO TO HELP US TO BETTER SERVE YOU.

1. Please do not disconnect the head phones or plug in places other than where you find them on the tape players
2. Please do not move laboratory equipment from one table to another, but leave it on the table where you found it.

3. Be sure that your desk is clean and that the equipment is dry and empty of water. You are responsible that each piece of equipment is just as you found it when you leave.

[illegible]

## PACKAGE CLOSE OUT SCHEDULE

|       |         |        |         |
|-------|---------|--------|---------|
| Pk. 1 | Week 2  | Pk. 2  | Week 3  |
| Pk. 3 | Week 4  | Pk. 4  | Week 5  |
| Pk. 5 | Week 6  | Pk. 6  | Week 7  |
| Pk. 7 | Week 8  | Pk. 8  | Week 9  |
| Pk. 9 | Week 10 | Pk. 10 | Week 11 |

## SCALE OF GRADING

70-77 = D      78-84 = C      85-93 = B      94-100 = A  
Below 70 = F

Tests count 90% of Average grade. Experiment counts 10%

## ASSIGNMENTS

**DATE**

Week 1 . Package 1. THE NATURE OF PHYSICAL SCIENCE  
Chapters 1&2 text  
Film strips: SCIENCE, TECHNOLOGY & SOCIETY  
Analyzing Scientific Data  
SIGNIFICANT FIGURES.

Week 2      Package 2      ENERGY  
Chapter 2 text  
Film Strips: ENERGY  
MEASUREMENT OF TIME

Week 3      Package 3      GRAVITY  
Chapter 4 text book  
Film Strips: UNIVERSAL GRAVITATION  
VECTORS, DIRECTED QUANTITIES

Week 4      Package 4      GRAVITY IN NATURAL PROCESSES  
Chapter 5 text book  
Film Strips: THE EARTH'S GRAVITATIONAL FIELD  
THE LIFE CYCLE OF RIVERS

- |         |             |   |
|---------|-------------|---|
| Week 5  | Package #5  | <p>FORCE AND MOTION</p> <p>Chapter 3 text book</p> <p>Film Strips: NEWTONS LAWS OF MOTION</p> <p>CIRCULAR MOTION</p> <p>MOMENTS OF FORCE</p>  |
| Week 6  | Package #6  | <p>FORCE AND MOTION IN NATURAL PROCESSES</p> <p>Chapter 6 text book.</p> <p>Film strips: BODIES IN MOTION</p> <p>DIASTROPHISM</p> <p>MOMENTS OF FORCE</p>   |
| Week 7  | Package #7  | <p>THE SOLAR SYSTEM</p> <p>Chapter 7 text book.</p> <p>Film strips: OUR SOLAR SYSTEM</p> <p>THE SUN AND ITS FAMILY AND ENERGY</p> <p>THE MOON AND ITS RELATIONSHIP TO THE EARTH</p> <p>THE EARTH AND ITS MOVEMENTS</p> <p>PLANETS AND COMETS</p>  |
| Week 8  | Package #8  | <p>ELECTRONICS AND THE ELECTRON</p> <p>Chapter 8 text book.</p> <p>Film strips: ELECTROMAGNETIC RADIATIONS</p> <p>STATIC ELECTRICITY</p> <p>FORCE FIELDS</p>  |
| Week 9  | Package #9  | <p>ELECTRICITY AND MAGNETISM</p> <p>Chapter 9 text book.</p> <p>Film strips: ELECTRIC CIRCUITS</p> <p>PRINCIPLES OF ELECTRIC MOTORS</p>   |
| Week 10 | Package #10 | <p>WAVE MOTION</p> <p>Chapter 10 text book.</p> <p>Film Strips: POLARIZED LIGHT</p> <p>LIGHT AND HOW IT IS REFLECTED</p> <p>LIGHT AND HOW IT IS REFRACTED</p> <p>OPTICAL ILLUSIONS</p> <p>VIBRATION AND SOUND WAVES</p> <p>THE SCIENCE OF MUSICAL INSTRUMENTS</p> <p>WAVES AND PULSES</p> <p>THE DOPPLER EFFECT</p> |

TEXTBOOK

Slabaugh, Butler; COLLEGE PHYSICAL SCIENCE, Prentice-Hall, Inc.  
All packages will be supplied.



WINTER

SYLLABUS

PHYSICAL SCIENCE 102

READ AT ONCE

AND

FOLLOW DIRECTIONS

AUDIO-TUTORIAL or SELF INSTRUCTIONAL LEARNING METHOD

We hope that you are going to enjoy learning by Audio-tutorial methods. You will find that this method of instruction puts the total responsibility of learning on you the student, allowing you to move at your own rate of speed. IT IS EASY TO GET BEHIND AND HARD TO CATCH UP. Stay on schedule. You will find an instructor always nearby to help you if you have difficulty. Do not hesitate to ask for assistance, however do not expect the instructor to do your work for you. We feel that you are here because you really desire to learn, and thus will do your best to do so. There are all sorts of ways you can avoid doing your own work, thinking that no one will be wiser, however, be assured that you will be found out. The course is so dovetailed that if you miss doing one single part, it will become obvious on the unit tests. You are the only person who gets hurt by doing this.

You are required to attend one of the two general classes meeting at either 8:30 A. M. or 6:30 P.M. on each Tuesday. Your attendance will be taken by you placing the numbered attendance slip which you will find in each package in the box in the lecture room. NO OTHER FORM OF SHOWING YOUR PRESENCE WILL BE ACCEPTED!

At the lecture you will be given general information, see films, and you may ask questions about things which may disturb you. Then you will be on your own, attending the learning-laboratory any time the room is open for your use. (See schedule posted on the door of C102.) PLEASE DO NOT ENTER NOR LEAVE THE LEARNING LAB THROUGH THE INSTRUCTOR'S OFFICE. USE THE OUTSIDE DOOR TO ROOM C102.

Clock in with the time clock, listen to the lecture tape and answer the questions on your practice sheets. Do the problems and discussion questions. Then move to the laboratory table. Always listen to the lab tape before you begin any experiment. You will find that this will save you much time in the long run. You are held responsible for the laboratory work, and you will find that questions on this material will appear on the unit tests. YOU CANNOT PASS PHYSICAL SCIENCE IF YOU DO NOT DO YOUR EXPERIMENTS.

In the laboratory, you may work with a partner of your choice. However, a partner means ONE PERSON ONLY.

When you have completed your work, you may take your test on THURSDAY, FRIDAY, and MONDAY. No tests will be given after 2:00 p.m. on MONDAY. You may take the test two times, receiving the higher grade. As for Mrs. Berrisoff or Mr. Martin to go over your first test with you so that you can see what you have missed. YOU MUST

USE A PENCIL ON THE ANSWER SHEET OF YOUR TEST; WE WILL NOT PROVIDE PENCILS FOR YOU. IF YOU USE A PEN THE MACHINE WILL GIVE YOU A ZERO AND THAT IS THE GRADE THAT YOU WILL RECEIVE. When you have completed your test, be sure that you have given the subject, test and package number. (Example: PHS 101 - PK. #6 Test C.) DO NOT CHEAT - any suspicious activity on your part will cause you to be dropped from PHYSICAL SCIENCE WITH A GRADE OF F and reported to SGA.

Your test grades will be posted on the back of your time cards. You can tell exactly where you stand by adding the average grades and dividing by the number of grades.

Physical Science requires that you spend 360 minutes each week in the learning lab if you are to receive credit for the course. This is a State Law and must be met. If your attendance hours get behind, you can be dropped from the course.

IF YOU MUST MISS TESTS ON A PACKAGE DUE TO ILLNESS, THEY MUST BE MADE UP NOT LATER THAN ONE WEEK AFTER YOUR MISSED DAYS. THEY WILL NOT BE GIVEN AFTER THIS TIME. The time necessary to complete a package is given on the package cover.

#### PACKAGE CLOSE OUT SCHEDULE

|        |         |
|--------|---------|
| Pk. 1  | Week 2  |
| Pk. 2  | Week 3  |
| Pk. 3  | Week 4  |
| Pk. 4  | Week 5  |
| Pk. 5  | Week 5  |
| Pk. 6  | Week 7  |
| Pk. 7  | Week 8  |
| Pk. 8  | Week 9  |
| Pk. 9  | Week 10 |
| Pk. 10 | Week 10 |



Package ten's test may be taken only once. It will consist of more questions than the other tests, and will cover not only package 10, but also the other nine packages. After the materials are removed from the learning center, it will not longer be available. You must complete a minimum of 8 packages in order to complete the course with a passing grade.

The instructor and the laboratory assistants are available to you for help. Please feel free to come into the instructor's office for help when you have questions and need assistance. The instructor will not be in the learning lab unless you need his help, so feel free to come and get him.

For comfort and convenience of all, there is to be NO FOOD, DRINKS, or SMOKING IN the Science Learning Lab.

PLEASE DO NOT MOVE LABORATORY EQUIPMENT FROM ONE TABLE TO ANOTHER, BUT LEAVE IT ON THE TABLE WHERE YOU FOUND IT. BE SURE THAT YOUR LAB DESK IS CLEAN AND THAT EQUIPMENT IS DRY AND EMPTY OF WATER. YOU ARE RESPONSIBLE THAT EACH PIECE OF EQUIPMENT IS JUST AS YOU FOUND IT.

A series of three rows of repeating geometric patterns. The first row consists of a sequence of upward-pointing triangles. The second row consists of a sequence of small circles. The third row consists of a sequence of downward-pointing triangles. The patterns are arranged in a slightly curved, horizontal line across the page.

| DATE   | ASSIGNMENTS  |
|--------|--|
| Week 1 | Package #1<br>ATOMIC THEORY<br>Chapter 11, text book<br>Film Strip: ATOMIC STRUCTURE & CHEMISTRY   |
| Week 2 | PACKAGE #2<br>ATOMIC STRUCTURE<br>Chapter 12, text book<br>Film Strip: CHEMICAL FORMULA  |
| Week 3 | Package #3<br>THE ELEMENTS AND THE PERIODIC TABLE<br>Chapter 13, text book<br>Film strips: THE EVOLUTION OF THE ELEMENTS<br>THE PERIODIC CHART |

- 
- Week 4      Package #4;    CHEMICAL BONDING  
                                  Chapter 14, text book  
                                  Film strips: COVALENT BONDING  
    COORDINATE-COVALENCE
- 
- Week 5      Package #5;    IONIC SUBSTANCES, ACIDS, BASES, AND SALTS  
                                  Chapter 15, text book  
                                  Film Strips: IONIC BONDING  
    ELECTROCHEMISTRY  
    ACIDS, BASES, AND SALTS
- 
- Week 6      Package #6;    COVALENT SUBSTANCES AND ORGANIC CHEMISTRY  
                                  Chapter 16, text book  
                                  Film strips: COVALENT BONDS-ORGANIC SUBSTANCES  
    ORGANIC CHEMISTRY
- 
- Week 7      Package #7;    THE WHY OF CHEMICAL REACTIONS  
                                  Chapter 17, text book  
                                  Film strips: Equations  
    Catalysts
- 
- Week 8      Package #8;    DIGESTION AND OTHER BIOPHYSICAL PROCESSES  
                                  Chapter 18, text book  
                                  Film strip: PHOTOSYNTHESIS  
    NUTRITION, ENERGY & GROWTH
- 
- Week 9      Package #9;    ELECTROCHEMICAL ENERGY  
                                  Chapter 19, text book  
                                  Film strip: SEMI CONDUCTORS  
    BATTERIES AND HOW THEY WORK
- 
- Week 10     Package #10;    HEAT ENERGY AND HEAT MACHINES  
                                  Chapter 20, text book  
                                  Film strip: HEAT & TEMPERATURE-MOLECULAR  
    ENERGY  
    WHAT MAKES ENGINES RUN
- 

TEXTBOOK

Slabaugh, Butler; COLLEGE PHYSICAL SCIENCE, Prentice-Hall, Inc.  
 All packages will be supplied

SCALE OF GRADING

78-84 = C  
 70-77 = D

85-93 = B

94-100 = A  
 Below 70 = I

READ AT ONCE AND  
FOLLOW DIRECTIONS

---

AUDIO-TUTORIAL OR SELF INSTRUCTIONAL/LEARNING METHOD

---

We hope that you are going to enjoy learning by Audio-tutorial methods. You will find that this method of instruction puts the total responsibility of learning on you the student, allowing you to move at your own rate of speed. IT IS EASY TO GET BEHIND AND HARD TO CATCH UP. Stay on schedule. You will find an instructor always nearby to help you if you have difficulty. Do not hesitate to ask for assistance, however do not expect the instructor to do your work for you. We feel that you are here because you really desire to learn, and thus will do your best to do so. There are all sorts of ways you can avoid doing your own work, thinking that no one will be wiser, however be assured that if you miss doing one single part, it will become obvious on the unit tests. You are the only person who gets hurt by doing this.

You are required to attend one of the two general class sessions each week. Your attendance will be taken by you placing the numbered attendance slip which you will find in each package in the box in the lecture room. NO OTHER FORM OF SHOWING YOUR PRESENCE WILL BE ACCEPTED!

At the lecture you will be given general information, see films demonstrations, and you may ask questions about things which may disturb you. Then you will be on your own, attending the learning-laboratory at any time the room is open for your use. (See schedule posted on the door of S102). PLEASE DO NOT ENTER NOR LEAVE THE LEARNING LAB THROUGH ANY INSTRUCTOR'S OFFICE. Use the outside door.

Clock in with the time clock, listen to the lecture tape and answer the questions on your practice sheets. Do the problems and discussion questions. Then move to a laboratory table. Always listen to the lab. tape before you begin any experiment. You will find that this will save you much time in the long-run. You are held responsible for the laboratory work and you will find that questions on this work will appear on the unit tests.

In the laboratory you may work with a partner of your own choice. However a partner means ONE PERSON. YOU MUST HAVE YOUR TIME CARD SIGNED ON THE BACK BY THE INSTRUCTOR OR HIS ASSISTANT FOR EACH EXPERIMENT OR YOU WILL NOT RECEIVE CREDIT FOR THE LAB.

When you have finished the package, take it to the Program Instruction Center (PIC) located on the second floor of G building. Present it to the person on duty at the desk and they will give you your test. YOU MUST SIGN IN AT THE PIC. You will be given a

question sheet and a machine graded answer sheet. Mark all over the question sheet if you wish, but be sure that you know the correct answer before you mark the answer sheet. DO NOT ERASE OR MARK ANY MARK OTHER THAN IS CALLED FOR ON THIS SHEET. USE A PENCIL ONLY--or the machine will reject and give you a grade of 0. Be sure that you put both the package number (Pk.#6) and test letter (Test C-R) on the answer sheet along with your name. Return both the test sheet and the answer sheet to the PIC desk, and they will give you the next package.

DO NOT CHEAT--any suspicious activity on your part will cause you to be dropped from PHYSICAL SCIENCE with a grade of NC and reported to SGA. When you have finished check out of the PIC.

Your test grade will be posted on the back of your time card in Mrs. Berrisoff's office in about 2 hours from the time you have taken the test. Please allow 6 hours before you ask Mrs. Berrisoff why your grade is not on your card.

Be sure to sign the time card on the back side when you first check into the lab on the first day.

DO NOT ASK FOR YOUR TEST TO BE GONE OVER WITH YOU ON PACKAGE CLOSE OUT DAY. At other times we will be most happy to go over tests with you.

All of the package should be complete before it is presented to the PIC for a test. Incomplete experiments will cause points to be deducted from your test grade, so be sure you do all of your work before you take your test. Satisfactory completed packages will be returned during the quarter. The time necessary to complete a package is given on the cover of each package. You are required by N.C. State law to spend 240 minutes a week in the learning lab.

#### PACKAGE CLOSE-OUT SCHEDULE

|       |        |        |         |
|-------|--------|--------|---------|
| Pk. 1 | Week 2 | Pk. 6  | Week 7  |
| Pk. 2 | Week 3 | Pk. 7  | Week 8  |
| Pk. 3 | Week 4 | Pk. 8  | Week 9  |
| Pk. 4 | Week 5 | Pk. 9  | Week 10 |
| Pk. 5 | Week 5 | Pk. 10 | Week 10 |

Package ten's test may be taken only once. It will consist of more questions than the other tests, and will cover not only package 10, but also the other none packages. After the materials are removed from the learning center, it will no longer be available. You must complete a minimum of 8 packages in order to complete the course with a passing grade.

DATE

|             |  |       |
|-------------|--|-------|
| Week 1      | KINETIC THEORY OF MATTER & THE GAS LAWS.<br>Chapter 21, text book.<br>Film strip: THE GAS LAWS   | Pk. 1 |
| Week 2      | THE PROCESS OF SOLUTION, ACID & BASE REACTIONS, & DRUGS<br>Chapter 22, text book<br>Film Strip: THE SOLUTION PROCESS   | Pk. 2 |
| Weeks 3 & 4 | HEAT IN NATURAL PROCESSES<br>Chapters 23 & 24, text book<br>Film Strips: WEATHERING & EROSION<br>GLACIATION<br>EARTHQUAKES & VOLCANOS<br><br>THE CHALLENGE OF THE WEATHER<br>THE ATMOSPHERE<br>HEAT AND PRESSURE & WINDS<br>MOISTURE | Pk. 3 |
| Weeks 5 & 6 | RADIOACTIVITY & NUCLEAR ENERGY<br>Chapters 25 & 26, text book<br>Film Strips: FALL OUT<br>RADIOACTIVITY<br>RADIATION MONITORING<br>PARTICLE ACCELERATORS<br>WHAT IS A NEUTRON?<br>DATING GEOLOGICAL EVENTS                           | Pk. 4 |
| Week 7      | THE UNIVERSE AND COSMOGONY<br>Chapter 27, text book<br>Film Strips: THE UNIVERSE IN COLOR<br>THE STARS AND OUTER SPACE<br>NEBULAE<br>CONSTELLATIONS  | Pk. 5 |
| Week 8      | POLLUTION-- AIR AND WATER<br>(not in textbook)<br>Film Strips: LET OUR WATERS LIVE<br>BEWARE OF ILL WINDS  | Pk. 6 |
| Week 9      | THE AVAILABILITY OF ENERGY<br>Chapter 28, text book<br>Film Strips: HARNESSING SOLAR ENERGY<br>POWER SOURCES OF THE FUTURE   | Pk. 9 |



Week 10

THE FUTURE OF PHYSICAL SCIENCE.  
Chapters 29 & 30, text book

Pk. 8

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NORTH CAROLINA STATE LAWS PROHIBIT EATING, DRINKING OR SMOKING IN  
THE SCIENCE LEARNING LABORATORY. SHOES MUST BE WORN BY LAW.

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TEXTBOOK

Slabough, Butler; COLLEGE PHYSICAL SCIENCE, Prentice-Hall, Inc.  
All packages will be supplied.

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SCALE OF GRADING

78-84 = C  
70-77 = D

85-93 = B

94-100 = A  
Below 70 = I

## SOUTHEASTERN'S FRESHMAN ENGLISH COURSES

Because many of you are coming to Southeastern with a wide range of English skills, Southeastern's English Department has developed a placement test to determine your level of English ability. The placement test is strictly for diagnostic purposes; it will not affect your grade in any class.

After you have taken the placement test and your test has been scored, you will have an interview with one of Southeastern's counselors. The counselor will explain your test results to you, and he or she will show you which of the three following courses is best for you.

### ENG 91 - Fundamentals of English

ENG 91 is a basic skills course. This course covers subject/verb agreement, noun/pronoun agreement, punctuation, usage, spelling, and sentence structure. This course meets five hours a week for three hours of credit. Students who have many deficiencies in their use of the English language should take this course.

### ENG 101 (RSL) - Freshman English I

RSL stands for Resources for Student Learning. When this designation is attached to an ENG 101 course then the class meets four hours a week for three hours of credit. One hour a week is a writing lab. Students who have some deficiencies in their use of the English language should take this course. Students enrolled in ENG 101 (RSL) can expect to receive additional individualized instruction as needed or when requested. ENG 101 (RSL) covers paragraph and theme writing. At least six themes are required during this course.

### ENG 101 - Freshman English I

ENG 101 is the standard Freshman English composition course. Students who are placed in ENG 101 have few deficiencies in usage, grammar, spelling, punctuation, or sentence structure. The course covers the essentials of good theme writing: pre-planning, organizing, writing, proofreading, and revising. The class meets three times a week for three hours of credit. At least six themes are required during the course.



## APPENDIX C

SCIENCE NEEDS QUESTIONNAIRE

The Science Department at Southeastern Community College wants to meet the needs of its students. Science education is a broad field, and your comments will help us focus our efforts.

This questionnaire DOES NOT affect your grade. DO NOT sign your name.

Please be HONEST and THOROUGH.

THANK YOU for your co-operation!

---

Instructions: On the answer sheet, circle the letter or letters of the responses that you feel best answer the questions. You may circle more than one letter per question if necessary.

---

1. Mark all courses you have completed at SCC or at some other college.

- |                          |                       |
|--------------------------|-----------------------|
| (a) Biology 101          | (h) Human Sexuality   |
| (b) Biology 102          | (i) Chemistry         |
| (c) Biology 103          | (j) Physics           |
| (d) Physical Science 101 | (k) Botany            |
| (e) Physical Science 102 | (l) Zoology           |
| (f) Physical Science 103 | (m) None of the above |
| (g) Anatomy & Physiology |                       |

2. What is your age?

- |           |             |
|-----------|-------------|
| (a) 18-20 | (d) 31-40   |
| (b) 21-25 | (e) Over 40 |
| (c) 26-30 |             |

3. What is your sex?

- (a) Female
- (b) Male

4. What is your race?

- (a) Black
- (b) Indian
- (c) White
- (d) Other

5. How many quarter hours are you taking now?

- (a) 0-3
- (b) 4-8
- (c) 9-12
- (d) 13-16
- (e) 17-18
- (f) More than 18

6. Which science courses did you have in junior and senior high school?

- (a) 7th grade life science
- (b) 8th grade earth science
- (c) 9th grade physical science
- (d) 10th grade biology
- (e) High school chemistry
- (f) High school physics
- (g) Advanced biology
- (h) Other \_\_\_\_\_

7. How many years has it been since you had your last high school science course?

- (a) Less than 1 year
- (b) 1-3 years
- (c) 4-6 years
- (d) 7-10 years
- (e) 11-15 years
- (f) More than 15 years

8. Which degree program are you in?

- (a) Associate in Applied Science (2 year occupational)
- (b) Associate in Arts, (Liberal arts, college transfer)
- (c) Associate in Fine Arts (Fine arts, college transfer)
- (d) Associate in Science (Science, college transfer)
- (e) Special Student
- (f) Undecided

9. Do you plan to transfer to another school after attending Southeastern?

- (a) Yes
- (b) No
- (c) Undecided

10. Do you plan to complete four years of college?

- (a) Yes
- (b) No
- (c) Undecided

11. Which career do you plan to pursue after completing school?

- |   |   |
|---|---|
| (a) Salesman, agent, broker                     | (i) Pilot, armed services, store manager, government official |
| (b) Doctor, lawyer, accountant                  | (j) Small business owner                                      |
| (c) Engineer, forester, scientist               | (k) Policeman, fireman, cook, barber                          |
| (d) Elementary teacher                          | (l) Machine operator, bus driver, factory worker              |
| (e) Plumber, electrician, auto mechanic         | (m) Medical technician, nurse, photographer                   |
| (f) Secretary, bookkeeper, bank teller, cashier | (n) Homemaker   |
| (g) Farmer, gardener, construction worker       | (o) Undecided   |
| (h) High school or college science teacher      | (p) Other _____   |

12. Which career (listed in number 11) would be your second choice if your first choice did not work out?

13. Which job (listed in number 11) comes closest to the kind that your father holds?

14. Which job (listed in number 11) comes closest to the kind that your mother holds?

- 4-
15. Why are you taking science?
- (a) I like science.
  - (b) I need science to graduate.
  - (c) I need science to transfer.
  - (d) I am taking it as an elective.
16. Do you think science meets your needs as a human being?
- (a) More than most other courses.
  - (b) Less than most other courses.
  - (c) About the same as other courses.
17. How do you feel about the difficulty of science courses here at Southeastern?
- (a) Too easy
  - (b) Too hard
  - (c) Just right for me
  - (d) Challenging but not impossible
18. What are your grades in science?
- (a) I generally make A or B.
  - (b) I generally make C.
  - (c) I generally make D or F.
19. Do your science grades reflect how much you learn?
- (a) I don't learn much and make good grades.
  - (b) I learn much and make poor grades.
  - (c) I learn much and make good grades.
  - (d) I don't learn much and make poor grades.
20. In which type(s) of activities do you spend most of your time for/in your science class?
- (a) Lecture by teacher
  - (b) Class discussion
  - (c) Special projects
  - (d) Field trips
  - (e) Individual study
  - (f) Demonstrations
  - (g) Labs

21. In which type(s) of activities do you feel that you are able to learn the best?

- |                        |                      |
|------------------------|----------------------|
| (a) Lecture by teacher | (e) Individual study |
| (b) Class discussion   | (f) Demonstrations   |
| (c) Special projects   | (g) Labs             |
| (d) Field trips        |                      |

22. Which topics did you not study in science at SCC but wish you had?

- |                             |  |
|-----------------------------|--|
| (a) Pollution problems      | (f) Nutrition and world food problems  |
| (b) Sex education           | (g) Evolution                          |
| (c) Drugs                   | (h) Animals of North Carolina & U.S.A. |
| (d) Energy conservation     | (i) Plants of North Carolina & U.S.A.  |
| (e) Overpopulation problems |  |

23. On the answer sheet, please write any comments that you feel might improve science courses at SCC.

## ANSWER SHEET

## SCIENCE NEEDS QUESTIONNAIRE

Instructions: Circle the letter or letters of the responses that you feel best answer the questions. You may circle more than one letter per question if necessary.

- (1) a b c d e f g h i j k l m
- (2) a b c d e
- (3) a b
- (4) a b c d
- (5) a b c d e f
- (6) a b c d e f g h \_\_\_\_\_
- (7) a b c d e f
- (8) a b c d e f
- (9) a b c
- (10) a b c
- (11) a b c d e f g h i j k l m n o p \_\_\_\_\_
- (12) a b c d e f g h i j k l m n o p
- (13) a b c d e f g h i j k l m n o p
- (14) a b c d e f g h i j k l m n o p
- (15) a b c d
- (16) a b c
- (17) a b c d
- (18) a b c
- (19) a b c d
- (20) a b c d e f g
- (21) a b c d e f g
- (22) a b c d e f g
- (23) \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_



## STUDENT COMMENTS

(23) On the answer sheet, please write any comments that you feel might improve science courses at SCC.

- "I feel there should be more demonstrations and class discussions, and less lectures and filmstrips."
- "Improve on science demonstrations and proper equipment."
- "Have a question and answer session on the lab package."
- "Break up some of the topics and have separate classes on pollution, energy conservation, greenhouse therapy, drugs, marine science, etc."
- "I feel that science courses do not really need improvement as such but I feel these courses could be improved by having field trips, more guest lecturers and attend seminars."
- "The course seems to be very good. A person sets his own pace to match his learning ability. The tapes work fine because you can have the instructor repeat himself as many times as needed."
- "Biology labs are boring; not enough activities to participate in."
- "I don't think the courses can be improved in any way because we are spoon-fed the information off a silver platter. Thus, if we as students don't get anything out of the lectures, labs, and discussions, then I guess we just don't want to."
- "I feel there should be most definitely need for everyone be a class that deals with the dangers of taking drugs."
- "Improve the activities for Lab."
- "Keep science of (sic) basic level, Instruct (sic) until it is understood."

## APPENDIX D

## SAMPLE TESTS REVIEWED

"Abstract Reasoning," "Mechanical Reasoning," "Numerical Ability," and "Verbal Reasoning." Differential Aptitude Tests. New York: The Psychological Corporation, 1961.

"Biology," "Chemistry," "Physics," "General Science," and "Advanced General Science." Cooperative Science Tests. Princeton, New Jersey: Educational Testing Service, 1963.

Cooley, W. W., and L. E. Klopfer. Test on Understanding Science. Princeton, New Jersey: Educational Testing Service, 1961.

Langner, William, R., and Eric A. Foretich. Reading Comprehension in the Natural Sciences. New York: Cowles Education Corporation, 1968.

"Letter Groups" and "Mosaic Comparisons." Comparative Guidance and Placement Program. Princeton, New Jersey: Educational Testing Service, 1975.

Nelson, Clarence H. Nelson Biology Test. New York: Harcourt Brace Jovanovich, Inc., 1965.

Osgood, C. E., G. J. Suci, and P. H. Tannenbaum. "Myself as a Biology Student," "Biology as a Subject," "My Biology Instructor," and "My School." The Measurement of Meaning. Urbana: University of Illinois Press, 1957.

Remmers, H. H. "A Scale to Measure Attitude toward Biology" and "A Scale to Measure Attitude toward Any Institution." Manual for the Purdue Master Attitude Scales. West Lafayette, Indiana: Purdue University, 1960.

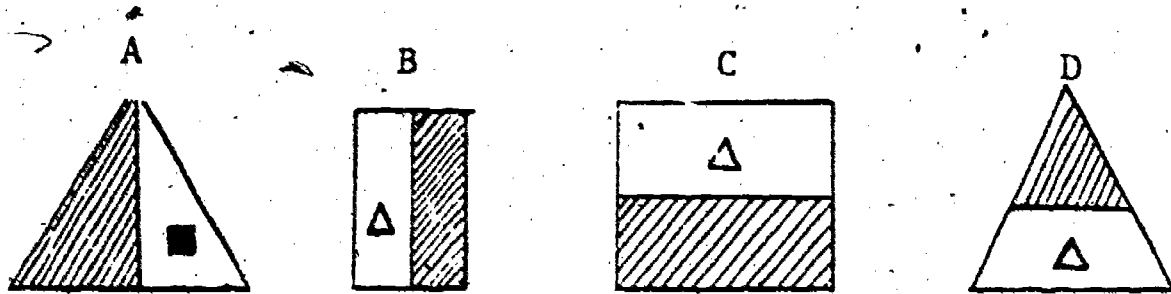
Sequential Tests of Educational Progress, Levels I and J. Princeton, New Jersey: Educational Testing Service, 1979.

Watson, Goodwin, and Edward Glaser. Critical Thinking Appraisal, Forms YM and ZM. New York: Harcourt, Brace & World, Inc., 1961.

# COGNITIVE DIAGNOSTIC TEST

ANSWER THE FOLLOWING QUESTIONS BY PLACING THE CORRECT LETTER, NUMBER OR WORD IN THE BLANK ON THE ANSWER SHEET. YOU MAY USE SCRATCH PAPER. DO NOT WRITE ON THIS EXAMINATION COPY.

1. There is a figure that is divided in half by a vertical line (a line that runs up and down.) On the left side of the line is a triangle. The right side is shaded. Which of the figures pictured below is described?



2. The word is inundate. Inundate means flood, overwhelm, to surround and enter every opening. Which picture below best illustrates the word inundate?



3. The next three letters in this sequence would be:

o x X O o x X O o x X O o x X \_ \_ \_

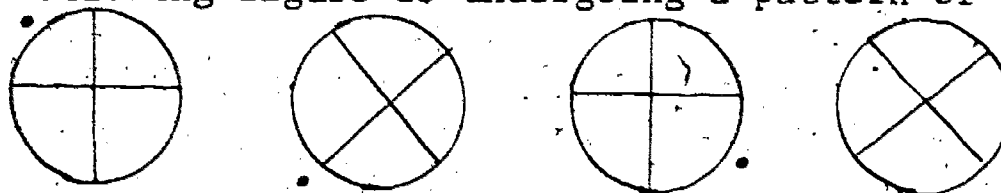
- (a) O X X  
(b) O x X  
(c) x o X  
(d) O o x

4. What letters are missing?

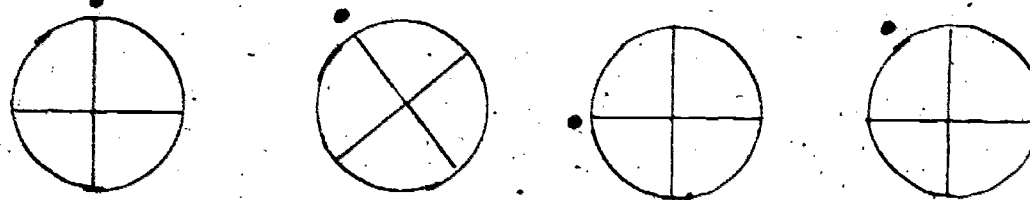
rEprE- - - - AtIvE

- (a) Sent  
(b) sEnt  
(c) seNt  
(d) senT

5. The following figure is undergoing a pattern of changes?



What is the next position the figure will assume?

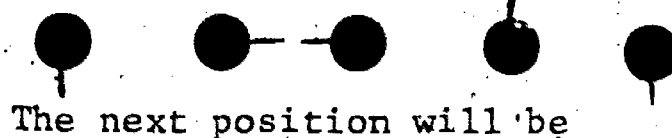


6. What letters are missing?

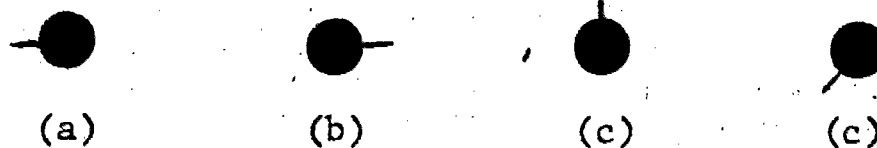
aRT- - - iC

- A. isT
- B. Ist
- C. iSt
- D. iST

7. The following figure is undergoing a series of changes.



The next position will be



8. The following is a code.

A = +  
B = \*  
C = !  
D = \$  
E = +  
F = \*  
G = !  
H = #  
I = +  
J = \*  
K =  
L =

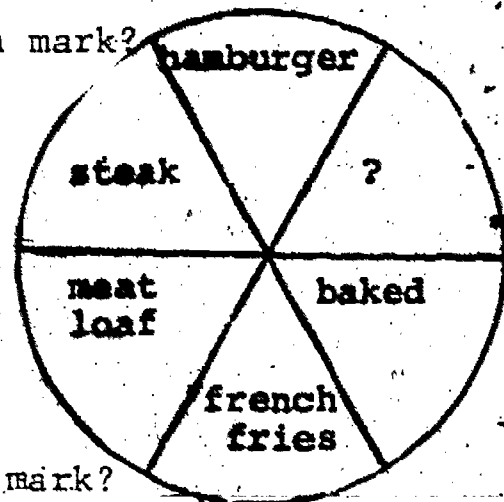
The work PLUS spelled in the code would be:

- A. # \* ! #
- B. \* # ! !
- C. ! \* ! +
- D. \$ # + !

9. The relationship of paint to canvas is the same as the relationship of:
- (a) artist to art
  - (b) linament to skin
  - (c) chair to room
  - (d) cigarette to ashtray
10. The relationship of vase to table is the same as the relationship of:
- (a) rug to floor
  - (b) letter to envelope
  - (c) tree to lawn
  - (d) smoke to chimney
11. The relationship of fertilizer to growth is the same as the relationship of:
- (a) light to reading
  - (b) pillow to bed
  - (c) photosynthesis to green
  - (d) minerals to sickness
12. The year after Harvey and Joanne married, Barbara was born to them. Twenty years later, Barbara married Phil, and within a year, they became parents of Michael. A year later, Harvey and Joanne had another child, Paula. What is the relationship of Paula to Michael?
- (a) an aunt
  - (b) a cousin
  - (c) a sister
  - (d) an uncle

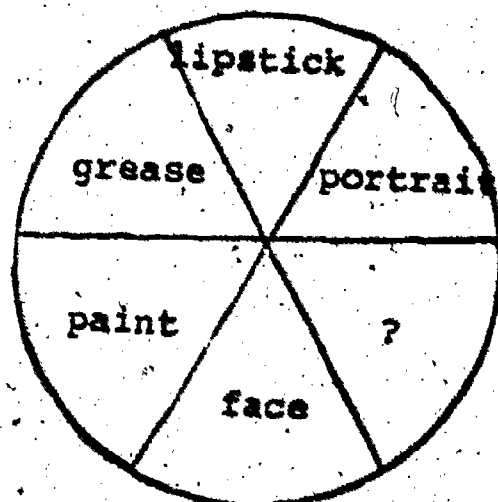
13. What should be in the section with the question mark?

- (a) chopped beef
- (b) string beans
- (c) mashed potatoes
- (d) salad



14. What should be in the section with the question mark?

- (a) skyscraper
- (b) engine
- (c) feet
- (d) table



15. Read the following sentence carefully.

The gribnots frockled in the duesbur, molicking their gimlots and cragling their henprel molocons.

The work in the sentence that might mean river would be:

- (a) gribnots
- (b) gimlots
- (c) duesbur
- (d) molocons

16. The word in the sentence given in question 15 that might mean washed is:

- (a) gimlots
- (b) frockled
- (c) molocons
- (d) duesbur

17. The work in the sentence given in question 15 that might mean hair is:

- (a) molocons
- (b) duesbur
- (c) cragling
- (d) gribnots

18. Given the terms window, pillow, feather, and wall, two are categories that include the other two as subcategories. The two subcategories are:

- (a) window and feather
- (b) window and pillow
- (c) feather and wall
- (d) window and wall

19. Given the terms word, leaf, page plant, two are categories that include the other two as subcategories. The two subcategories are:

- (a) leaf and page
- (b) word and page
- (c) page and plant
- (d) word and leaf

20. Given the terms square, corner, petals, flower, two are categories that include the other two as subcategories. The two subcategories are:

- (a) corner and flower
- (b) square and flower
- (c) flower and petals
- (d) corner and petals



21. pattern, phone number, memorize, polka-dot

To of the above words or phrases are categories in which the other two would be subcategories. The subcategories are:

- (a) pattern, memorize
- (b) phone number, polka-dot
- (c) memorize, polka-dot
- (d) phone number, memorize

22.  $a + b = b + a$ ;  $a - b \neq b - a$ ;  $3 + 2 = 2 + 3$ ;  $7 - 5 \neq 5 - 7$

Two of the above expressions are categories in which the other two would be subcategories. The subcategories are:

- (a)  $a + b = b + a$ ;  $a - b \neq b - a$
  - (b)  $3 + 2 = 2 + 3$ ;  $7 - 5 \neq 5 - 7$
  - (c)  $a + b = b + a$ ;  $3 + 2 = 2 + 3$
  - (d)  $a \times b = b \times a$ ;  $3 \times 2 = 2 \times 3$
- (Note: The symbol  $\neq$  means "does not equal")

23.  $\frac{x}{y} = 3$ ;  $\frac{6}{2} = 3$ ;  $xy = 12$ ;  $6 \times 2 = 12$

Two of the above expressions are categories in which the other two would be subcategories. The subcategories are:

- (a)  $\frac{x}{y} = 3$ ;  $6 \times 2 = 12$
- (b)  $xy = 12$ ;  $6 \times 2 = 12$
- (c)  $\frac{6}{2} = 3$ ;  $\frac{x}{y} = 3$
- (d)  $\frac{6}{2} = 3$ ;  $6 \times 2 = 12$

24.  $a \times b = b \times a$ ; therefore (which of the following is the logical conclusion)?

- (a)  $a + b = b + a$
- (b)  $17 \times 2 = 2 \times 17$
- (c)  $17 + 2 = 2 + 17$
- (d)  $8 \times 2 = 4 \times 4$

25. All planets of this solar system can be seen with a telescope. Mercury is a planet of this solar system. Therefore:

- (a) It is closer to Earth than Mars
- (b) It can be seen with a teloscope
- (c) It has the same temperature as Earth
- (d) It is possible for a spaceship to get to Mercury

26.  $\frac{8}{2} \neq \frac{2}{8}$ ;  $\frac{6}{3} \neq \frac{3}{6}$ . Therefore:

(a)  $a \times b = b \times a$

(b)  $\frac{4}{2} \neq \frac{2}{4}$

(c)  $\frac{12}{3} \neq \frac{6}{3}$

(d)  $\frac{a}{b} \neq \frac{b}{a}$

27. The relationship of light to room is the same as the relationship as

- (a) water to lake
- (b) man to house
- (c) ashes to fireplace
- (d) food to table

28. Read the following section:

When a seed is viable it means that it will germinate or start to grow. I know that these seeds are viable because I planted them and they all grew into separate, health plants.

Which of the following statements is the evidence for the conclusion?

- (a) These seeds are viable.
- (b) Viable means "ability to grow".
- (c) These seeds germinated.
- (d) The plants are healthy.

29. Which of the statements in question number 28 is the conclusion that the evidence proves?

30. Sam and Charlie each have a dog and a house. The one who has the large dog lives in a small house. The large house is painted green. Charlie lives in a white house.

Which statement below is correct?

- (a) Charlie has a large dog.
- (b) Sam lives in the small house.
- (c) Charlie has a small dog.
- (d) Charlie lives alone.

31. If I had watered this plant and put it in the light it wouldn't have died.

From this statement you know:

- (a) The plant wasn't watered.
- (b) The plant was neither watered nor kept in the light.
- (c) The plant was either not watered or not kept in the light.

(d) Water and/or light were not given to the plant.

32.  $X = YB$       Another way of writing  $XY$  is:  
 $Y = O$   
 $B = GGG$       (a)  $XGGG$   
                  (b)  $OGGGO$   
                  (c)  $OGGGX$   
                  (d)  $YBGGG$

33.  $Y = XOX$       Another way of writing  $YBB$  is :  
 $X = BB$       (a)  $YOB BX$   
                  (b)  $BBOOYX$   
                  (c)  $BBYOOX$   
                  (d)  $YXXX$

34.  $O = GB$       Another way of writing  $OYYX$  is:  
 $X = YY$   
 $Y = BG$       (a)  $GBBGYYY$   
                  (b)  $YGG$   
                  (c)  $GBYYXO$   
                  (d)  $BGGBYXO$

35. Emma Thompson is a member of the South Holyoke Baptist Church. She attends church every Sunday, the Sewing Bee on Wednesday afternoons and the Ladies Guild on Fridays. Each year she helps to prepare the Christmas Baskets for the orphanage.

Which of the following is implied in this passage?

- (a) Emma Thompson is a devout Baptist.  
(b) Emma Thompson believes in God.  
(c) Emma Thompson is a hard working member of her church.  
(d) All of Emma Thompson's time and efforts are put into church.
36.  $a = b$ ;  $b = c$ ; therefore:  
(a)  $a + c = b$   
(b)  $a = c$   
(c)  $a + b = c$   
(d)  $b - a = c$
37. Most plants are green. Green plants can undergo photosynthesis. Therefore:  
(a) Photosynthesis is a chemical process.  
(b) Green plants are photosynthetic.  
(c) Most plants are photosynthetic.  
(d) Green plants are undergoing a chemical process.

38.  $a=b$ ;  $b=c$ ; therefore:

- (a)  $a + b = b + c$
- (b)  $a - b = c$
- (c)  $a - c = b$
- (d)  $c - a = b$

39.  $a = a$ ;  $b = c$ , therefore

- (a)  $\frac{a}{b} = \frac{c}{b} = 1$
- (b)  $\frac{a}{c} = \frac{c}{b} = 2$
- (c)  $\frac{c}{a} = \frac{b}{a} = 0$
- (d)  $a = b = c = 3$

40. Write a word that can be made from the letters S Y E E.

Master Answer Sheet

Answer Sheet

Diagnostic Cog. (40)

- |              |                 |
|--------------|-----------------|
| 1. <u>B</u>  | 21. <u>B</u>    |
| 2. <u>C</u>  | 22. <u>B</u>    |
| 3. <u>D</u>  | 23. <u>D</u>    |
| 4. <u>B</u>  | 24. <u>B</u>    |
| 5. <u>D</u>  | 25. <u>B</u>    |
| 6. <u>D</u>  | 26. <u>D</u>    |
| 7. <u>B</u>  | 27. <u>A</u>    |
| 8. <u>D</u>  | 28. <u>C</u>    |
| 9. <u>B</u>  | 29. <u>A</u>    |
| 10. <u>C</u> | 30. <u>A</u>    |
| 11. <u>A</u> | 31. <u>D</u>    |
| 12. <u>A</u> | 32. <u>B</u>    |
| 13. <u>C</u> | 33. <u>C</u>    |
| 14. <u>B</u> | 34. <u>A</u>    |
| 15. <u>C</u> | 35. <u>C</u>    |
| 16. <u>B</u> | 36. <u>B</u>    |
| 17. <u>A</u> | 37. <u>C</u>    |
| 18. <u>A</u> | 38. <u>A</u>    |
| 19. <u>D</u> | 39. <u>A</u>    |
| 20. <u>D</u> | 40. <u>EYES</u> |

## POST-HIGH SCHOOL SELF-CONCEPT OF ABILITY SCALE

In each of the following questions circle the letter in front of the statement which best answers each question.

1. How do you rate yourself in school ability compared with other students your age in college?

- a. I am the best
- b. I am above average
- c. I am average
- d. I am below average
- e. I am among the poorest

2. What kind of grades do you think you are capable of getting in college?

- a. mostly A's
- b. mostly B's
- c. mostly C's
- d. mostly D's
- e. mostly F's

3. For those college courses you are interested in, how well do you feel you have the ability to do?

- a. among the best
- b. above average
- c. about average
- d. probably below average
- e. among the poorest

4. Where do you think you would rank in a college graduating class?

- a. among the best
- b. above average
- c. average
- d. below average
- e. among poorest

5. How do you rate yourself in scholastic ability as compared to those who have elected to go beyond high school?

- a. I am the best
- b. I am above average
- c. I am average
- d. I am below average
- e. I am the poorest

6. How do you rate yourself in scholastic ability as compared to those who have elected not to go beyond high school?

- a. among the best
- b. above average
- c. average
- d. below average
- e. among the poorest

- 5
7. How do you rate yourself in scholastic ability compared to those who are planning to major in a profession such as law, medicine, dentistry, or engineering at a college or university?
- a. among the best
  - b. above average
  - c. average
  - d. below average
  - e. among the poorest
8. Do you think you have the ability to attend a graduate school?
- a. yes, definitely
  - b. yes, probably
  - c. not sure either way
  - d. probably not
  - e. no
9. Do you think you have the ability to complete graduate school?
- a. yes, definitely
  - b. yes, probably
  - c. not sure either way
  - d. probably not
  - e. no
10. Where do you think you would rank in your class in graduate school?
- a. among the best
  - b. above average
  - c. average
  - d. below average
  - e. among the poorest
11. Forget for a moment how others might grade you. If you attended graduate school, in your opinion, how good do you think your work would be?
- a. among the best
  - b. above average
  - c. average
  - d. below average
  - e. among the poorest
12. What do you think would be your class rank in comparison with the majors in professional schools, such as law, medicine, dentistry?
- a. among the best
  - b. above average
  - c. average
  - d. below average
  - e. among the poorest

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